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Results for Greenland halibut, American plaice and Atlantic cod of the Spanish survey in NAFO Div. 3NO for the period 1997-2015

by

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Abstract

Greenland halibut (*Reinhardtius hippoglossoides*), American plaice (*Hippoglossoides platessoides*) and Atlantic cod (*Gadus morhua*) indices from the bottom trawl survey that Spain carries out in Spring since 1995 in Div. 3NO of the NAFO Regulatory Area are presented. Biomass, stratified mean catches and mean number per tow for the three species are presented since 1997, year in which the survey extended the depth strata. Mean catch per tow, length distribution and age distribution are presented for the last five years (2011-2015). Greenland halibut biomass and abundance estimates presented a decreasing trend since 1999, cut in year 2007 with an increase, reaching in 2009 the highest value in the series. In 2011 the biomass drops under the 2008 value, being stable since then with a slight increase in 2015. In last years it can be seen a presence of juveniles, mainly in 2004, but the greatest lengths have failed, although in 2009 there is a quite good presence of individuals of ages 6-7 and in 2010 between 5-7. In 2011-2015 the presence of all ages is poor, although in 2015 an increase in the range of the length can be seen with regards to last years. For American plaice we can see an increasing trend along the whole period, reaching a maximum of mean catch and number in 2006. The greatest recruitment in the presented series occurred in 2004 and we can follow their mode along the years. No good recruitments were seen since then, but a discrete occurrence of individuals of 12-20 cm appears in 2015. For Atlantic cod it can be seen a general decreasing in the biomass between 2002 and 2005 and an increasing since then, especially in 2006 and, higher, in 2009-2011, decreasing again in 2012-2013 but reaching the maximum in the series in 2014. In 2015 the biomass is in the level of the 2012 biomass but the mean number is almost the same as in 2014. In 2007-2008 the youngest length classes were much over the rest of the length classes. With the 2006 cohort the series reaches the maximum number of its historical values at five years in 2011. There have been no good recruitments since 2009, although in 2015 a discrete presence of individuals of age 1 can be seen.

Material and Methods

Since 1995, Spain carries out a Spring-Summer survey in the NAFO Regulatory Area of Div. 3NO. From 1995 to 2000, the survey was conducted on board the C/V *Playa de Menduña* with a net trawl type *Pedreira*. In 2001 this vessel was replaced by the R/V *Vizconde de Eza*, using a trawl net type *Campelen*. For more details about the technical specifications of the surveys, see Walsh *et al.*, 2001 and González Troncoso *et al.*, 2004.

The catch of each haul was sorted and weighted into species and a sample of each species was taken in order to measure the length distribution. For Greenland halibut, American plaice and Atlantic cod each individual of

the sample was measured to the total length to the nearest lower cm. As in 1995 and 1996 only depth less than 1000 m was surveyed, these years are not representative for these species, so only data from 1997 are presented. We present the total annual indices of biomass and abundance for the period 1997-2015.

The number of valid tows, the depth strata covered and the dates of the survey series (1997-2015) are presented in Table 1. Table 2 shows the swept area and number of hauls by stratum for the last five years (2011-2015). To know the results of the rest of the years, see González-Troncoso *et al.*, 2013.

For each species, we present all the transformed indices until 2000 and no-transformed from 2002 to 2015. In 2001 there are data transformed from the former vessel with original data from the new vessel. To know more about the transformation, see González-Troncoso *et al.*, 2005 and González-Troncoso *et al.*, 2006. We present the mean catch, the length distribution in number by sex and year; and the mean numbers with their mean length and mean weight by age for the years 2011-2015. To see the results of the rest of the years, see González-Troncoso *et al.*, 2013.

Figure 1 presents the maps with the distribution of the catches of the three species during the 2015 Spanish 3NO survey.

Results

Greenland halibut

The Greenland halibut stock in Subarea 2 and Div. 3KLMNO is considered to be part of a biological stock complex, which includes Subareas 0 and 1. Abundance and biomass indices were available from research vessel surveys by Canada in Div. 2J+3KLMNO (1978-2014), EU in Div. 3M (1988-2014), EU-Spain in Div. 3NO (1997-2014) and EU-Spain in Div. 3L (2003-2014). In 2003 the Fisheries Commission implemented a fifteen years rebuilding plan for this stock, establishing progressively decreasing TACs. The catches in 2004-2010 have exceeded the rebuilding plan TACs by 30% on average, despite reductions in fishing effort. In 2011-2014, only STATLANT 21A catch data were available, so the data were inconsistent with regards last years assessments.

The current assessment is based on surveys. The surveys provide coverage of the majority of the spatial distribution of the stock and the area from which the majority of catches are taken. Over 1995-2003, indices from the majority of the surveys generally provided a consistent signal in stock biomass. Results since 2004 show greater divergence which complicates interpretation of overall status, but generally suggest stability in stock biomass over 2008-2014. The exploitable biomass (age 5+) declined to low levels in 1995-97 due to very high catches and high fishing mortality. It increased during 1998-2000 due to greatly reduced catches, much lower fishing mortality and improved recruitment. Biomass increased over 2004-2008 with decreases in fishing mortality. However, it has shown decreases over 2008-2014, in part due to weaker year-classes recruiting to the biomass. Recruitment (ages 1-4) was below average in 2013 and 2014 (NAFO, 2015).

Mean catches and Biomass

Table 3 shows the mean catches and their variance per haul and year for Greenland halibut in the period 2011-2015. Biomass per stratum for the same period is presented in Table 4. Annual total biomass, as the biomass corresponding to ages 5+ and 10+, and mean weight per tow with the total variance per year are presented in Table 5 for years 1997-2015. In Figure 2, we compare the mean catch per tow with the mean number per tow. Figure 3 presents the biomass per swept area per stratum and their total variance per year, as the 5+ and 10+ biomass. In Table 6, we present the length-weight relationship parameters a and b for 2011-2015.

Greenland halibut biomass increased from 1997 to 1999 and then decreased until 2002, reaching the lowest value of the whole time-series. From 2002 to 2007, it maintained almost constant values at very low levels. It peaked in 2009 and in 2010, and after decreasing in 2011 to a half of the 2010 value, it has maintained stable

at higher values than before 2008, with a slight increase in 2015. The biomass 5+ has had the same trend as the total biomass with a marked increase during 2008-2010, being the highest values of the series, and a decrease in 2011 being stable until 2014, with a new increase in 2015. Since 2007, the 5+ biomass represents more than the 90% of total biomass. In the case of the 10+ biomass, it has increased since 2006, reaching the maximum value of the time-series in 2015. Despite of this, with respect to the mean number per tow, although in the 2008-2010 period there was a substantial increase in the numbers, this increase is not as the increase in biomass, reaching the level of the 2001 numbers per tow, but still far of the values of the first years of our series. Since 2009, there has been a decrease in numbers with a slight increase in the last two years.

Length Distribution

Table 7 presents the mean number per tow by sex and year for 1997-2015. Table 8 shows this index by length, sex and year, with the number of samples in which there were length measures, the total number of individuals measured in these samples, the sampled catch and the range of lengths met, as the total catch of this species and the total hauls made in the survey, for years 2011-2015. In Figures 4 and 5 we can follow the evolution along the years. We can follow a mode since 1997 until 2001, but since then no high new values appears. The highest recruitments were in 1997, 2001 and 2004. In 2006 and 2007 the small individuals (around 12-14 cm, corresponding to 1 year of age) are the mode of the length distribution range, but all the length ranges were poor. The same occurred in 2011, with a mode in lengths 14-15, that corresponds to age 1. In 2009 and 2010 an increase in number for lengths between 38-52 cm (ages 5-7) can be seen, but they almost disappear in 2011. It seems that the high increase in the biomass in 2009-2010 was due to the higher presence of these length classes, while at the beginning of the series the presence of juveniles was stronger. In 2011-2015 the presence of all the length classes was poor. In 2015 an increase in the range of the length can be seen with regards to last years.

Age numbers

We present the mean number by age, sex and year in Table 9 for 2011-2015 and the total by year (for the entire series) in Figure 6. Individuals between 0 and 20 years were caught in the period 1997-2015 and since 2002 more number of younger individuals has been caught. It can be due to the change of gear and/or vessel. We can follow three conspicuous cohorts in our series, the 1994-1996 cohorts (ages 1, 2 and 3 in 1997). Cohorts from following years seem to be weaker than those ones, but more constant. 2001-2003 cohorts appear to be quite strong, as we can see in recent years, particularly 2002 one, and these cohorts seem to be present in year 2008 (ages 5 to 7) and in 2009 (ages 6 to 8). In 2010 the mode of the ages is between 5 and 7 years, which can imply that the cohorts of years 2004 and 2005 could be better than it can be seen in the graph. In 2014 and 2015 the mode is at 7 years old. Age 1 represents almost the 10% of the total numbers in 2015.

Mean length and mean weight

Mean length and weight at age by sex for 2011-2015 are presented in Tables 10 and 11, and for the entire series in Figures 7 and 8. The greatest ages increased their mean length and weight until 2003, and fell in the youngest individuals. In 2011-2015 the mean length and weight were more or less constant, although it seems to be lower for the oldest ages. The total mean length and the total mean weight have increased since 2006.

American plaice

There was no directed fishing of American plaice in 1994 and there has been a moratorium since 1995. Even under moratorium, catches increased substantially from 1995 to 2003 and then decreased. Biomass and SSB are low compared to historic levels. SSB declined to the lowest estimated level in 1994 and 1995. It has increased since then but still remains very low. Although estimated recruitment at age 5 has been higher from 2003-2008 than from 1995-2002, recruitment has been low since the late 1980s (NAFO, 2015).

Mean catches and Biomass

American plaice mean catches and SD by stratum are presented in Table 12 for 2011-2015. Biomass for stratum for the same period is presented in Table 13.

The annual entire time series (1997-2015) of biomass and stratified mean catches with their SD estimates for American plaice are presented in Table 14. Estimated parameters a and b values of length-weight distribution are presented in Table 15 for 2011-2015.

The American plaice indices show a general increasing trend along the years, agree with the results from the Canadian surveys. Biomass increased from a depressed value in 1997 to 2000. Since then, it fluctuated from a minimum in 2002 to maximum values in 2006 and 2008. It decreased substantially from 2013 to 2014 (Table 14; Figures 9 and 10).

Length Distribution

Table 16 shows the mean number per tow by sex and year for 1997-2015, and Table 17 the same index by length for 2011-2015, besides the sampled size and catch. Figures 11 and 12 show length distribution by sex and year for the entire period. Between years 2000 and 2004 we can follow a mode that then disappeared; probably the 1998 year-class. In 2004 there is a great presence of juveniles (8 cm) and in 2005 the mode appears around 14 cm, following with a mode of around 20 cm in 2006, 24 in 2007, 26 in 2008 and 28 in 2009. This mode can be seen around 30 cm in 2010, 32 cm in 2011 and 34 cm in 2012, but the mode length in those years is 28, as in 2009. In 2008 and 2010 there is a quite good presence of juveniles (individuals of 10-12 cm in 2008 and 12 cm in 2010) that does not appear in 2011-2013. A discrete occurrence of individuals of 12-20 cm appears in 2015.

Age numbers

We present the mean number per tow at age by sex and by year (2011-2015) in Table 18 and the total by year (1997-2015) in Figure 13. The ALK used for all years is the 3N Canadian one. We can follow a cohort without problems since the year 2000, starting in individuals of 2 years old (1998 cohort), reaching 17 year old in 2015 (almost disappeared); a second cohort, weaker, can be followed since 1999, starting in 2 years old (1997 cohort). Another cohort from the year 2002 (one year old in 2003), can be followed until 2015, reaching 13 years old, although it failed at 5 years old. And the 2003 cohort (one year in 2004) is a very strong cohort, reaching in 2008 five years old and the largest number in the whole series, and in 2015 twelve years old. In 2015 the maximum is in 7 years old, which indicates that the cohort from 2008 is quite strong.

Mean length and mean weight

Mean length and weight at age by sex for 2011-2015 are presented in Tables 19 and 20, and shown in Figures 14 and 15. The mean length is more or less stable in all ages, at least since 2002. The same occurs with the mean weight, although with more variations. The major variations appear in the oldest ages studied: 12+ years old individuals. From 1997 to 1999 a general decreasing in the two means is observed.

Atlantic cod

Atlantic cod in Divisions 3NO has been under moratorium to directed fishing since 1994. According to the NAFO Scientific Council, the stock of Atlantic cod in Divisions 3NO declined dramatically during the mid-1980s. SSB has increased considerably over the past five years but the 2015 estimate of 38 454 t still represents only 64% of B_{lim} . This increase in biomass has been driven by the relatively strong 2005 and 2006 year classes and by fishing mortality values that are amongst the lowest in the time series ($F < 0.1$) and well below F_{lim} (0.3). More recent year classes do not appear as strong and hence despite the low fishing mortality, the increasing trend in SSB may not persist beyond the short term (NAFO, 2015).

Mean Catches and Biomass

Atlantic cod mean catches and SD by stratum are presented in Table 21 for 2011-2015. Biomass by stratum and year are presented in Table 22 for the same period.

The entire time series (1997-2015) of biomass and stratified mean catches with their SD estimates for Atlantic cod are presented in Table 23. Estimated parameters a and b values of length-weight relationship are presented in Table 24 for 2011-2015.

Biomass of cod presents very poor values between 1997 and 2005 with some fluctuations and a great deviation due to a few hauls in which the presence of that species was very high (e.g., 2001). Since 2006 an increasing trend in the biomass of this species can be seen. Although the 2006 increase is above all for a single catch of almost 2 tons, in general the catches of Atlantic cod in the survey of 2006 were over the mean. In 2008 a quite high increase is shown, and in this case there is no haul with very high catches (the maximum was 585.5 kg). Since then the biomass has increased to values well above the years before, reaching the maximum of the series in 2014 after a decrease in 2012 and 2013, decreasing again in 2015 to the 2012 level (Table 23; Figures 16 and 17). In 2014 there were five hauls with more than 1 ton catch, two of them with more than 3 tons and one with more than 8 tons of catch.

Length Distribution

Table 25 presents the mean number per tow by year for 1997-2015 and this index by length for the period 2011-2015 can be seen in Table 26, besides the sampled size and its catch. Figures 18 and 19 show the length distribution by year (1997-2015). The modal values used to be very low before 2006 except in 2001, and in general all lengths presence was very low, even it is very difficult to follow the modal values. In 2001 we had a good presence of individuals between 36 and 58 cm. From 2006 a series of great modal values along the length distribution can be seen. In 2006 there were two modes in the length distribution, one around 30 cm and another one around 40 cm. There was no good recruitment until 2004, in which the individuals between 12 and 16 cm correspond to the greatest presence in the series, and in 2005 between 24 and 32, with a new mode between 12 and 16 cm, as in last year. In 2007 the youngest lengths dominated the length range, with the highest mode in the lengths 12-16, that are between 2 and 4 times the abundance of the 48 cm length class, the following mode. In 2008-2015 we can follow the evolution of these lengths. In 2015 the mode is in 36 cm, with a discrete presence of individuals of lengths 6-8 cm. It must be note that, although the biomass has decrease from 2014 to 2015, the mean number is almost the same in both years, probably due to the presence of the smallest individuals.

Age numbers

The mean number per tow at age by sex and year (2011-2015) is presented in Table 27 and the total by year (1997-2015) in Figure 20. In accordance with the length distribution, until 2006, the numbers are too low to follow any cohort. But between 2006 and 2008 there are three good cohorts that we can follow (2005-2007 cohorts). With the 2006 cohort the series reaches the maximum number of its historical values at five years in 2011. But it seems that no new good recruitments have occurred since 2009, although in 2015 a discrete presence of individuals of age 1 can be seen.

Mean length and mean weight

Mean length and weight at age by sex over time are presented in Tables 28 and 29 (2011-2015), and shown in Figures 21 and 22 (1997-2015). For the central ages, the mean length and the mean weight seem to be more or less stable. That does not occur in the oldest ages, with the two parameters very scattered. The total mean length and mean weight presented no trend until 2006, and since then they increased with a marked decrease in 2015.

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Table 1. Spanish spring bottom trawl surveys in NAFO Div. 3NO: 1997-2015.

Year	Vessel	Valid tows	Depth strata covered (m)	Dates
1997	<i>C/V Playa de Menguña</i>	128	42-1263	April 26-May 18
1998	<i>C/V Playa de Menguña</i>	124	42-1390	May 06-May 26
1999	<i>C/V Playa de Menguña</i>	114	41-1381	May 07-May 26
2000	<i>C/V Playa de Menguña</i>	118	42-1401	May 07-May 28
2001 ^(*)	<i>R/V Vizconde de Eza</i>	83	36-1156	May 03-May 24
	<i>C/V Playa de Menguña</i>	121	40-1500	May 05-May 23
2002	<i>R/V Vizconde de Eza</i>	125	38-1540	April 29-May 19
2003	<i>R/V Vizconde de Eza</i>	118	38-1666	May 11-June 02
2004	<i>R/V Vizconde de Eza</i>	120	43-1539	June 06-June 24
2005	<i>R/V Vizconde de Eza</i>	119	47-1485	June 10-June 29
2005	<i>R/V Vizconde de Eza</i>	119	47-1485	June 10-June 29
2006	<i>R/V Vizconde de Eza</i>	120	45-1480	June 7-June 27
2007	<i>R/V Vizconde de Eza</i>	110	45-1374	May 29-June 19
2008	<i>R/V Vizconde de Eza</i>	122	45-1374	May 27-June 16
2009	<i>R/V Vizconde de Eza</i>	109	45-1374	May 31-June 18
2010	<i>R/V Vizconde de Eza</i>	95	45-1374	May 30-June 18
2011	<i>R/V Vizconde de Eza</i>	122	44-1450	June 5-June 24
2012	<i>R/V Vizconde de Eza</i>	122	44-1450	June 3-June 21
2013	<i>R/V Vizconde de Eza</i>	122	44-1450	June 1-June 21
2014	<i>R/V Vizconde de Eza</i>	122	44-1450	June 2-June 21
2015	<i>R/V Vizconde de Eza</i>	122	44-1450	May 31-June 19

(*)For the calculation of the series, 83 hauls were taken from the *R/V Vizconde de Eza* and 40 hauls from the *C/V Playa de Menguña* (123 hauls in total)

Table 2. Swept area and number of hauls by stratum. Spanish Spring Surveys in NAFO Div. 3NO: 2011- 2015.
Swept area in square miles. n.s. means stratum not surveyed.

Stratum	2011		2012		2013		2014		2015	
	Swept area	Tow number	Swept area	Tow number	Swept area	Tow number	Swept area	Tow number	Swept area	Tow number
353	0.0349	3	0.0338	3	0.0349	3	0.0379	3	0.0401	3
354	0.0345	3	0.0338	3	0.0338	3	0.0394	3	0.0390	3
355	0.0233	2	0.0229	2	0.0225	2	0.0263	2	0.0263	2
356	0.0229	2	0.0225	2	0.0225	2	0.0266	2	0.0255	2
357	0.0225	2	0.0229	2	0.0236	2	0.0263	2	0.0233	2
358	0.0345	3	0.0330	3	0.0338	3	0.0390	3	0.0349	3
359	0.0806	7	0.0806	7	0.0829	7	0.0908	7	0.0855	7
360	0.2374	20	0.2344	20	0.2231	19	0.2629	20	0.2363	20
374	0.0225	2	0.0229	2	0.0233	2	0.0259	2	0.0229	2
375	0.0360	3	0.0349	3	0.0360	3	0.0390	3	0.0341	3
376	0.1178	10	0.1181	10	0.1305	11	0.1324	10	0.1159	10
377	0.0233	2	0.0229	2	0.0236	2	0.0259	2	0.0233	2
378	0.0240	2	0.0229	2	0.0225	2	0.0263	2	0.0225	2
379	0.0221	2	0.0225	2	0.0240	2	0.0255	2	0.0225	2
380	0.0229	2	0.0229	2	0.0229	2	0.0263	2	0.0229	2
381	0.0233	2	0.0221	2	0.0244	2	0.0259	2	0.0236	2
382	0.0450	4	0.0454	4	0.0484	4	0.0521	4	0.0458	4
721	0.0229	2	0.0233	2	0.0225	2	0.0266	2	0.0240	2
722	0.0225	2	0.0221	2	0.0221	2	0.0259	2	0.0259	2
723	0.0218	2	0.0225	2	0.0221	2	0.0259	2	0.0233	2
724	0.0233	2	0.0225	2	0.0225	2	0.0255	2	0.0236	2
725	0.0240	2	0.0225	2	0.0229	2	0.0255	2	0.0229	2
726	0.0225	2	0.0221	2	0.0221	2	0.0248	2	0.0229	2
727	0.0225	2	0.0233	2	0.0229	2	0.0259	2	0.0225	2
728	0.0229	2	0.0229	2	0.0233	2	0.0248	2	0.0225	2
752	0.0236	2	0.0229	2	0.0233	2	0.0240	2	0.0225	2
753	0.0225	2	0.0221	2	0.0236	2	0.0240	2	0.0233	2
754	0.0225	2	0.0221	2	0.0240	2	0.0225	2	0.0225	2
755	0.0454	4	0.0446	4	0.0454	4	0.0454	4	0.0450	4
756	0.0206	2	0.0221	2	0.0229	2	0.0229	2	0.0229	2
757	0.0236	2	0.0214	2	0.0240	2	0.0244	2	0.0229	2
758	0.0225	2	0.0221	2	0.0225	2	0.0221	2	0.0221	2
759	0.0218	2	0.0221	2	0.0225	2	0.0229	2	0.0229	2
760	0.0214	2	0.0225	2	0.0229	2	0.0364	3	0.0225	2
761	0.0236	2	0.0221	2	0.0225	2	0.0240	2	0.0240	2
762	0.0225	2	0.0225	2	0.0218	2	0.0229	2	0.0229	2
763	0.0349	3	0.0330	3	0.0341	3	0.0233	2	0.0341	3
764	0.0225	2	0.0225	2	0.0214	2	0.0259	2	0.0251	2
765	0.0225	2	0.0229	2	0.0221	2	0.0240	2	0.0236	2
766	0.0225	2	0.0225	2	0.0221	2	0.0221	2	0.0236	2
767	0.0233	2	0.0203	2	0.0218	2	0.0221	2	0.0229	2

Table 3. Greenland halibut mean catch (kg) and SD by stratum. Spanish Spring Surveys in NAFO Div. 3NO: 2011-2015. n.s. means stratum not surveyed.

Stratum	2011		2012		2013		2014		2015	
	GHL Mean catch	GHL SD	GHL Mean catch	GHL SD	GHL Mean catch	GHL SD	GHL Mean catch	GHL SD	GHL Mean catch	GHL SD
353	0.78	0.82	0.36	0.46	2.81	2.97	0.25	0.25	0.11	0.18
354	0.08	0.14	0.30	0.40	0.13	0.10	0.08	0.12	0.61	0.87
355	2.44	2.73	0.73	0.79	0.14	0.02	0.22	0.15	5.04	7.00
356	1.48	0.37	0.14	0.20	0.30	0.32	0.33	0.30	1.10	1.43
357	0.18	0.14	0.13	0.10	0.03	0.05	0.37	0.49	0.47	0.54
358	0.27	0.38	0.00	0.00	0.12	0.20	0.09	0.15	0.02	0.03
359	0.06	0.09	0.06	0.13	0.03	0.09	0.33	0.86	0.00	0.00
360	0.00	0.02	0.00	0.00	0.01	0.06	0.01	0.05	0.00	0.01
374	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
375	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
376	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
377	0.01	0.02	0.00	0.00	0.00	0.00	0.01	0.01	0.15	0.21
378	0.04	0.03	0.00	0.00	0.00	0.00	0.22	0.31	0.03	0.05
379	2.26	3.07	4.56	3.48	0.58	0.19	1.21	0.88	0.02	0.02
380	4.53	1.00	3.30	1.12	7.63	2.97	0.92	1.24	2.38	0.88
381	0.68	0.02	0.01	0.01	0.00	0.00	0.04	0.06	0.91	1.13
382	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.12	0.14
721	17.80	7.87	3.90	1.20	3.17	4.45	0.27	0.31	2.34	0.04
722	22.12	2.07	33.38	39.30	18.30	11.34	12.80	4.75	24.22	13.02
723	7.03	9.68	7.77	3.40	6.35	8.79	1.16	1.47	5.58	0.09
724	13.85	2.19	14.99	8.91	6.90	6.60	11.96	13.26	20.72	15.86
725	5.73	1.14	6.16	0.70	1.97	0.04	1.29	0.09	2.51	1.24
726	20.33	2.87	25.33	1.22	10.86	0.71	7.93	3.61	22.88	15.06
727	26.29	10.16	37.78	33.12	40.56	41.80	21.39	3.03	9.78	1.80
728	47.33	20.05	18.77	10.28	15.20	9.79	14.94	5.95	20.21	20.51
752	24.10	9.75	21.96	3.59	16.91	1.92	29.69	8.04	50.45	10.96
753	26.57	0.33	27.90	10.89	13.27	8.84	37.60	28.28	21.65	5.73
754	20.90	17.82	23.42	1.29	31.42	38.45	19.95	5.02	22.35	2.33
755	15.09	11.23	14.12	7.50	12.21	2.12	26.00	19.72	25.70	21.22
756	23.30	13.44	33.86	31.11	16.18	17.45	35.19	9.88	44.67	2.59
757	12.38	2.71	46.23	41.68	34.86	34.14	31.02	7.87	51.77	19.99
758	10.83	3.92	27.56	4.78	32.55	7.49	33.94	7.50	35.70	4.25
759	18.27	14.47	22.09	7.76	32.81	7.57	12.35	5.97	44.64	14.75
760	30.50	33.38	32.07	11.36	28.03	4.24	18.42	10.50	37.97	28.68
761	36.28	12.86	33.38	18.63	15.12	6.07	36.81	7.44	50.94	23.95
762	41.67	8.44	14.68	7.16	7.17	2.84	19.16	3.79	58.78	6.02
763	17.93	11.36	27.47	17.71	9.49	1.43	10.58	2.68	28.55	19.86
764	32.86	11.57	35.52	16.26	23.92	13.70	21.79	5.40	28.98	0.53
765	14.02	6.51	20.79	0.51	11.97	8.99	10.94	12.62	23.60	6.05
766	15.10	8.37	25.59	22.44	15.75	18.84	12.70	2.36	16.88	0.82
767	18.02	19.18	4.42	1.73	7.21	7.64	9.93	0.54	10.82	12.01

Table 4. Greenland halibut survey biomass (t) by stratum in NAFO Div. 3NO: 2011-2015. n.s. means stratum not surveyed.

Strata	2011	2012	2013	2014	2015	Strata	2011	2012	2013	2014	2015
353	18	9	65	5	2	725	50	57	18	11	23
354	2	7	3	2	12	726	130	165	71	46	144
355	16	5	1	1	28	727	224	312	340	159	83
356	6	1	1	1	4	728	323	128	102	94	140
357	3	2	0	5	7	752	267	252	191	324	587
358	5	0	2	2	0	753	326	348	155	432	257
359	2	2	1	11	0	754	334	381	471	319	358
360	1	0	3	3	1	755	512	487	414	883	880
374	0	0	0	0	0	756	228	309	143	311	394
375	0	0	0	0	0	757	107	441	296	260	462
376	0	0	0	0	0	758	95	247	286	304	319
377	0	0	0	0	1	759	213	254	370	137	496
378	0	0	0	2	0	760	439	439	377	234	520
379	22	43	5	10	0	761	525	516	230	525	726
380	38	28	64	7	20	762	785	277	140	355	1089
381	8	0	0	0	11	763	403	652	218	237	655
382	0	0	0	0	4	764	292	307	224	168	231
721	101	22	18	1	13	765	154	225	134	113	248
722	165	248	139	83	157	766	193	327	205	165	206
723	100	107	89	14	74	767	245	69	105	142	149
724	148	165	76	116	217						

Table 5. Greenland halibut survey biomass (t) with SD and stratified mean catch per tow (kg) and SD by in NAFO Div. 3NO: 1997-2015.

Year	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Biomass	6859	11305	11246	9331	7721	2380	4701	3437	3071	2720
SD	546	860	973	707	790	410	575	373	325	379
Biomass 5+	4303	6284	6367	8785	6700	2011	3386	2318	2585	2151
Biomass 10+	406	504	660	1111	741	279	495	318	380	182
MCPT	7.73	11.73	12.00	9.48	8.17	2.64	5.10	3.68	3.39	3.03
SD	0.62	0.89	1.00	0.75	0.84	0.45	0.61	0.40	0.36	0.42

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015
Biomass	3286	7272	12927	12462	6483	6830	4959	5482	8519
SD	363	708	1506	1197	593	631	606	465	664
Biomass 5+	3057	6908	11971	12057	6091	6297	4697	5322	8397
Biomass 10+	343	798	1134	1158	1163	1587	1319	1529	1759
MCPT	3.98	7.66	14.78	14.80	7.09	7.37	5.46	6.24	9.49
SD	0.44	0.74	1.73	1.40	0.63	0.69	0.47	0.53	0.73

Table 6. Greenland halibut length weight relationships in Spanish Spring Surveys in NAFO Div. 3NO: 2011-2015. E(x) means Error of the parameter x.

Males							Females						Indet.					
	a	b	E(a)	E(b)	R2	N	a	b	E(a)	E(b)	R2	N	a	b	E(a)	E(b)	R2	N
2011	0.00540	3.09233	0.1308	0.0378	0.993	516	0.0029	3.2753	0.0688	0.0186	0.998	871	0.0033	3.2445	0.0666	0.0185	0.998	1401
2012	0.00566	3.08178	0.0846	0.0236	0.999	441	0.0034	3.2350	0.1038	0.0277	0.998	865	0.0037	3.2099	0.0976	0.0267	0.998	1309
2013	0.00474	3.11481	0.0763	0.0218	0.998	364	0.0038	3.2000	0.0704	0.0191	0.998	737	0.0054	3.1051	0.1402	0.0385	0.99	1109
2014	0.00449	3.14211	0.0825	0.0239	0.997	444	0.0045	3.1576	0.0994	0.0272	0.995	719	0.0047	3.1452	0.0913	0.0251	0.996	1164
2015	0.00354	3.20453	0.0962	0.0281	0.996	441	0.0034	3.2296	0.0638	0.0172	0.998	789	0.0028	3.2852	0.0692	0.019	0.998	1239

Table 7. Greenland halibut mean number per tow by year in Spanish Spring Surveys in NAFO Div. 3NO: 1997-2015. Indet. means indeterminate.

1997					1998				1999				2000				2001			
Males	Females	Indet.	Total		Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total
MNPT	11.087	16.467	1.445	28.999	14.270	19.987	0.239	34.496	14.821	21.726	0.251	36.799	6.364	11.103	0.286	17.753	9.894	14.977	1.036	25.907
2002					2003				2004				2005				2006			
Males	Females	Indet.	Total		Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total
MNPT	3.262	4.718	0.111	8.092	5.077	8.101	0.111	13.288	6.738	8.459	0.087	15.284	3.381	5.359	0.012	8.752	3.683	4.765	0.007	8.455
2007					2008				2009				2010				2011			
Males	Females	Indet.	Total		Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total
MNPT	2.895	4.803	0.048	7.746	3.698	7.075	0.051	10.825	8.980	14.667	0.128	23.775	6.657	13.979	0.010	20.646	3.849	6.847	0.107	10.802
2012					2013				2014				2015							
Males	Females	Indet.	Total		Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total				
MNPT	3.453	6.618	0.010	10.081	2.234	4.463	0.049	6.746	2.614	4.853	0.004	7.472	2.785	6.951	0.046	9.782				

Table 8. Greenland halibut mean number per tow by length class and year. Spanish Spring Survey in NAFO 3NO: 2011-2015. Indet. means indeterminate.

Length (cm.)	2011				2012				2013				2014				2015			
	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total
6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.016	0.016
8	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.004	0.021	0.000	0.010	0.031
10	0.018	0.010	0.034	0.061	0.000	0.000	0.000	0.000	0.013	0.013	0.016	0.041	0.078	0.064	0.000	0.142	0.242	0.104	0.013	0.359
12	0.220	0.195	0.042	0.458	0.000	0.030	0.010	0.040	0.101	0.071	0.028	0.200	0.149	0.109	0.000	0.258	0.203	0.225	0.007	0.435
14	0.455	0.773	0.031	1.259	0.018	0.019	0.000	0.036	0.017	0.014	0.000	0.031	0.049	0.020	0.000	0.069	0.054	0.046	0.000	0.100
16	0.121	0.275	0.000	0.396	0.004	0.003	0.000	0.007	0.048	0.058	0.000	0.106	0.062	0.038	0.000	0.100	0.014	0.028	0.000	0.043
18	0.013	0.064	0.000	0.077	0.017	0.026	0.000	0.043	0.056	0.099	0.000	0.155	0.101	0.088	0.000	0.189	0.071	0.068	0.000	0.139
20	0.101	0.112	0.000	0.213	0.058	0.075	0.000	0.133	0.057	0.066	0.000	0.122	0.118	0.224	0.000	0.342	0.117	0.101	0.000	0.219
22	0.261	0.261	0.000	0.522	0.139	0.241	0.000	0.380	0.053	0.058	0.000	0.111	0.237	0.348	0.000	0.585	0.090	0.099	0.000	0.189
24	0.191	0.255	0.000	0.446	0.348	0.526	0.000	0.874	0.026	0.033	0.000	0.058	0.081	0.197	0.000	0.278	0.029	0.039	0.000	0.068
26	0.117	0.146	0.000	0.263	0.358	0.625	0.000	0.983	0.005	0.000	0.000	0.005	0.020	0.033	0.000	0.053	0.022	0.009	0.000	0.031
28	0.052	0.086	0.000	0.138	0.222	0.284	0.000	0.506	0.063	0.035	0.000	0.098	0.016	0.023	0.000	0.040	0.036	0.047	0.000	0.083
30	0.100	0.174	0.000	0.275	0.084	0.083	0.000	0.167	0.086	0.136	0.000	0.222	0.022	0.000	0.000	0.022	0.034	0.098	0.000	0.132
32	0.166	0.147	0.000	0.313	0.126	0.106	0.000	0.232	0.111	0.228	0.000	0.339	0.035	0.033	0.000	0.068	0.042	0.076	0.000	0.118
34	0.109	0.150	0.000	0.259	0.112	0.163	0.000	0.275	0.123	0.252	0.000	0.374	0.039	0.073	0.000	0.112	0.048	0.034	0.000	0.082
36	0.104	0.106	0.000	0.210	0.195	0.146	0.000	0.341	0.124	0.138	0.000	0.262	0.059	0.073	0.000	0.132	0.058	0.038	0.000	0.097
38	0.156	0.214	0.000	0.370	0.152	0.326	0.000	0.478	0.146	0.278	0.000	0.424	0.121	0.136	0.000	0.258	0.096	0.050	0.000	0.146
40	0.176	0.271	0.000	0.447	0.232	0.393	0.000	0.625	0.137	0.174	0.000	0.311	0.125	0.126	0.000	0.251	0.133	0.182	0.000	0.315
42	0.226	0.375	0.000	0.601	0.253	0.417	0.000	0.670	0.149	0.379	0.000	0.528	0.214	0.275	0.000	0.489	0.176	0.227	0.000	0.403
44	0.172	0.402	0.000	0.574	0.240	0.450	0.000	0.690	0.098	0.359	0.000	0.457	0.186	0.323	0.000	0.509	0.132	0.446	0.000	0.577
46	0.291	0.338	0.000	0.629	0.239	0.368	0.000	0.607	0.166	0.364	0.000	0.530	0.246	0.362	0.000	0.609	0.130	0.613	0.000	0.743
48	0.257	0.457	0.000	0.714	0.228	0.388	0.000	0.616	0.152	0.285	0.000	0.437	0.123	0.378	0.000	0.501	0.274	0.825	0.000	1.099
50	0.196	0.468	0.000	0.664	0.144	0.326	0.000	0.470	0.107	0.205	0.000	0.312	0.190	0.472	0.000	0.663	0.292	0.756	0.000	1.048
52	0.134	0.399	0.000	0.534	0.121	0.298	0.000	0.419	0.156	0.243	0.000	0.399	0.139	0.241	0.000	0.380	0.187	0.766	0.000	0.954
54	0.100	0.324	0.000	0.424	0.067	0.304	0.000	0.371	0.093	0.223	0.000	0.317	0.106	0.260	0.000	0.366	0.146	0.578	0.000	0.724
56	0.055	0.227	0.000	0.282	0.063	0.241	0.000	0.304	0.071	0.139	0.000	0.210	0.090	0.184	0.000	0.275	0.123	0.538	0.000	0.661
58	0.046	0.181	0.000	0.228	0.018	0.219	0.000	0.237	0.038	0.079	0.000	0.116	0.007	0.162	0.000	0.170	0.014	0.310	0.000	0.323
60	0.006	0.165	0.000	0.171	0.015	0.187	0.000	0.202	0.023	0.156	0.000	0.179	0.000	0.148	0.000	0.148	0.000	0.194	0.000	0.194
62	0.000	0.099	0.000	0.099	0.000	0.116	0.000	0.116	0.017	0.130	0.000	0.146	0.000	0.095	0.000	0.095	0.000	0.138	0.000	0.138
64	0.000	0.051	0.000	0.051	0.000	0.064	0.000	0.064	0.000	0.072	0.000	0.072	0.000	0.073	0.000	0.073	0.000	0.086	0.000	0.086
66	0.006	0.017	0.000	0.023	0.000	0.025	0.000	0.025	0.000	0.049	0.000	0.049	0.000	0.068	0.000	0.068	0.000	0.042	0.000	0.042
68	0.000	0.012	0.000	0.012	0.000	0.033	0.000	0.033	0.000	0.030	0.000	0.030	0.000	0.062	0.000	0.062	0.000	0.029	0.000	0.029
70	0.000	0.005	0.000	0.005	0.000	0.025	0.000	0.025	0.000	0.015	0.000	0.015	0.000	0.025	0.000	0.025	0.000	0.047	0.000	0.047
72	0.000	0.010	0.000	0.010	0.000	0.041	0.000	0.041	0.000	0.022	0.000	0.022	0.000	0.057	0.000	0.057	0.000	0.041	0.000	0.041
74	0.000	0.005	0.000	0.005	0.000	0.025	0.000	0.025	0.000	0.025	0.000	0.025	0.000	0.028	0.000	0.028	0.000	0.007	0.000	0.007
76	0.000	0.026	0.000	0.026	0.000	0.021	0.000	0.021	0.000	0.006	0.000	0.006	0.000	0.039	0.000	0.039	0.000	0.015	0.000	0.015
78	0.000	0.021	0.000	0.021	0.000	0.005	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.015	0.000	0.015	0.000	0.014	0.000	0.014
80	0.000	0.008	0.000	0.008	0.000	0.000	0.000	0.000	0.000	0.024	0.000	0.024	0.000	0.000	0.000	0.000	0.000	0.007	0.000	0.007
82	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.000	0.006
84	0.000	0.000	0.000	0.000	0.000	0.016	0.000	0.016	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.011
86	0.000	0.009	0.000	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.000	0.008
88	0.000	0.008	0.000	0.008	0.000	0.005	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
90	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.000	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
92	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
94	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
96	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
98	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
100	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
102	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
104	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	3.849	6.847	0.107	10.802	3.453	6.618	0.010	10.081	2.234	4.463	0.049	6.746	2.614	4.853	0.004	7.472	2.785	6.951	0.046	9.782
N° samples:				77				67				67				77				73
N° Ind.:	701	1211	15	1927	549	1073	2	1624	378	756	8	1142	467	863	1	1331	444	1119	8	1571
Sampled catch:				1082				1149				857				956				1421
Range:				10-89				12-89				7-90				9-79				7-87
Total catch:				1112				1197				885				961				1426
Total hauls:				122				122				122				122				122

Table 9. Greenland halibut mean number per tow by age, sex and year. Spanish Spring Survey in NAFO 3NO: 2011-2015. Indet. means indeterminate.

Age	2011				2012				2013				2014				2015			
	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total
0																				
1	0.81	1.28	0.11	2.20	0.02	0.05	0.01	0.08	0.13	0.09	0.05	0.27	0.31	0.20	0.00	0.51	0.53	0.36	0.05	0.93
2	0.60	0.70		1.30	0.65	1.15		1.80	0.20	0.26		0.45	0.46	0.83		1.28	0.28	0.33		0.62
3	0.19	0.29		0.48	0.63	0.71		1.34	0.09	0.14		0.23	0.14	0.12		0.26	0.10	0.11		0.20
4	0.27	0.34		0.62	0.17	0.27		0.44	0.24	0.57		0.81	0.04	0.11		0.14	0.04	0.18		0.21
5	0.38	0.56		0.95	0.47	0.62		1.09	0.40	0.78		1.17	0.26	0.29		0.54	0.26	0.21		0.47
6	0.94	1.07		2.01	0.55	1.16		1.71	0.46	1.01		1.48	0.69	0.96		1.65	0.55	1.26		1.81
7	0.53	1.60		2.12	0.77	1.23		2.00	0.55	0.67		1.22	0.60	1.14		1.74	0.86	2.52		3.38
8	0.08	0.35		0.43	0.13	0.41		0.54	0.07	0.26		0.33	0.10	0.35		0.45	0.14	0.80		0.94
9	0.03	0.20		0.22	0.03	0.37		0.40	0.06	0.15		0.21	0.03	0.18		0.21	0.03	0.40		0.44
10	0.00	0.23		0.24	0.03	0.31		0.34	0.02	0.22		0.24		0.23		0.23		0.35		0.35
11	0.00	0.05		0.05		0.11		0.11	0.01	0.13		0.13		0.18		0.18		0.19		0.19
12	0.01	0.05		0.06		0.05		0.05		0.09		0.09		0.11		0.11		0.10		0.10
13		0.02		0.02		0.06		0.06		0.03		0.03		0.05		0.05		0.03		0.03
14		0.06		0.06		0.05		0.05		0.04		0.04		0.03		0.03		0.04		0.04
15		0.01		0.01		0.01		0.01		0.01		0.01		0.03		0.03		0.02		0.02
16		0.02		0.02		0.03		0.03		0.02		0.02		0.03		0.03		0.03		0.03
17		0.01		0.01		0.02		0.02		0.01		0.01						0.02		0.02
18						0.01		0.01		0.01		0.01								
19																				
20																				
Total	3.85	6.85	0.11	10.80	3.45	6.62	0.01	10.08	2.23	4.46	0.05	6.75	2.61	4.85	0.00	7.47	2.79	6.95	0.05	9.78

Table 10. Greenland halibut mean length (cm) per tow by age, sex and year. Spanish Spring Survey in NAFO 3NO: 2011-2015. Indet. means indeterminate.

Age	2011				2012				2013				2014				2015			
	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total
0																				
1	14.65	15.16	13.17	14.88	15.14	14.30	13.50	14.41	13.13	12.88	12.06	12.85	13.15	12.75	9.50	12.96	12.19	12.69	9.44	12.25
2	23.46	23.44		23.45	24.91	25.23		25.12	19.77	19.69		19.73	21.35	22.28		21.95	21.15	20.87		21.00
3	29.13	29.26		29.21	28.30	27.61		27.94	27.00	27.13		27.08	24.48	24.88		24.66	26.32	28.59		27.52
4	32.87	33.09		32.99	33.83	34.15		34.02	32.39	33.72		33.33	31.78	34.53		33.80	31.07	32.71		32.43
5	38.60	39.62		39.21	38.41	39.21		38.87	37.55	40.07		39.21	38.51	39.07		38.80	37.83	40.01		38.81
6	45.54	44.62		45.05	43.29	43.64		43.52	44.02	45.49		45.03	43.97	44.98		44.56	44.08	45.61		45.14
7	51.33	51.33		51.33	49.03	49.50		49.32	51.04	51.26		51.16	51.07	50.95		50.99	51.25	51.21		51.22
8	56.53	54.66		55.02	54.63	55.18		55.05	56.36	55.64		55.80	56.10	54.58		54.91	55.92	55.02		55.15
9	56.78	58.14		57.97	57.28	57.15		57.16	58.34	56.39		56.95	57.50	57.47		57.47	57.50	57.28		57.30
10	61.50	61.16		61.17	58.40	60.38		60.21	61.14	61.68		61.63		60.91		60.91		60.46		60.46
11	61.50	63.34		63.29		63.57		63.57	63.50	63.69		63.68		64.75		64.75		63.70		63.70
12	67.50	65.30		65.54		66.62		66.62		65.43		65.43		67.25		67.25		66.82		66.82
13		63.40		63.40		68.66		68.66		71.23		71.23		74.39		74.39		72.71		72.71
14		75.62		75.62		72.80		72.80		71.72		71.72		73.34		73.34		72.45		72.45
15		77.38		77.38		72.50		72.50		74.50		74.50		74.91		74.91		75.21		75.21
16		85.57		85.57		75.50		75.50		80.98		80.98		76.20		76.20		77.99		77.99
17		86.50		86.50		84.50		84.50		81.50		81.50						86.05		86.05
18						89.50		89.50		90.50		90.50								
19																				
20																				
Total	34.36	39.15	13.17	37.18	37.75	42.30	13.50	40.71	39.73	44.60	12.06	42.75	36.84	44.22	9.50	41.62	37.34	47.91	9.44	44.72

Table 11. Greenland halibut mean weight (g) per tow by age, sex and year. Spanish Spring Survey in NAFO 3NO: 2011-2015. Indet. means indeterminate.

Age	2011				2012				2013				2014				2015			
	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total
0																				
1	22	22	15	22	25	20	16	20	15	14	13	14	16	15	6	15	11	13	5	12
2	95	91		93	117	119		118	53	55		54	70	84		79	64	66		65
3	187	189		188	173	159		165	140	156		150	105	119		111	128	177		154
4	268	280		275	293	311		304	241	298		281	237	326		302	213	267		258
5	441	504		479	434	487		465	383	520		473	442	483		463	410	511		456
6	739	744		742	626	689		669	626	775		728	661	755		716	661	782		745
7	1063	1179		1150	925	1036		993	991	1133		1069	1056	1119		1098	1063	1137		1118
8	1422	1444		1439	1288	1461		1420	1341	1471		1443	1408	1392		1396	1397	1432		1426
9	1439	1753		1715	1483	1640		1627	1490	1529		1518	1519	1628		1615	1524	1622		1615
10	1838	2071		2067	1583	1958		1925	1724	2039		2009		1959		1959		1932		1932
11	1838	2322		2309		2313		2313	1938	2266		2243		2380		2380		2288		2288
12	2451	2567		2555		2702		2702		2471		2471		2677		2677		2673		2673
13		2327		2327		2976		2976		3256		3256		3690		3690		3510		3510
14		4167		4167		3603		3603		3315		3315		3512		3512		3462		3462
15		4465		4465		3523		3523		3721		3721		3772		3772		3919		3919
16		6252		6252		4032		4032		4861		4861		3966		3966		4414		4414
17		6426		6426		5782		5782		4960		4960						6030		6030
18						6963		6963		6935		6935								
19																				
20																				
Total	465	774	15	657	509	841	16	726	587	930	13	810	551	989	6	835	602	1124	5	970

Table 12. American plaice mean catch (kg) and SD by stratum. Spanish Spring Surveys in NAFO Div. 3NO: 2011-2015. n.s. means stratum not surveyed.

[illegible]

Table 13. American plaice survey biomass (t) by stratum in NAFO Div. 3NO: 2011-2015. n.s. means stratum not surveyed.

Strata	2011	2012	2013	2014	2015	Strata	2011	2012	2013	2014	2015
353	4077	1152	5009	1183	1481	725	0	0	0	0	2
354	698	1506	1286	1063	1492	726	0	0	0	0	0
355	179	62	68	30	22	727	6	288	0	1	0
356	0	2	5	0	4	728	0	9	0	0	0
357	0	0	0	8	3	752	0	0	0	0	0
358	175	65	525	324	977	753	0	0	0	0	0
359	3489	4668	5065	1993	7683	754	0	0	0	0	0
360	111356	94879	113616	56766	61846	755	0	0	0	0	0
374	15468	10250	17537	11279	5637	756	0	0	0	0	0
375	3401	1385	1482	2468	1356	757	0	0	0	0	0
376	7078	3880	5317	4655	5919	758	0	0	0	0	0
377	1029	3201	1268	1586	1784	759	0	0	0	0	0
378	232	36	47	153	834	760	0	0	0	0	0
379	3	0	0	0	0	761	0	0	0	0	0
380	71	75	15	57	7	762	0	0	0	0	0
381	889	1988	1457	1603	6180	763	0	0	0	0	0
382	3008	14517	2567	2525	11039	764	0	0	0	0	0
721	1	0	0	0	0	765	0	0	0	0	0
722	0	0	0	0	0	766	0	0	0	0	0
723	0	1	0	0	0	767	0	0	0	0	0
724	0	0	0	0	0						

Table 14. American plaice survey biomass (t) with SD and stratified mean catch per tow (kg) and SD by in NAFO Div. 3NO: 1997-2015.

Year	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Biomass	21827	64635	110010	152997	101137	69511	116842	129432	123227	170910
SD	4495	5946	5825	16740	10841	7097	9777	12335	11396	24806
MCPT	25.80	72.25	128.72	175.49	115.95	77.77	127.17	143.93	138.77	202.84
SD	5.09	6.51	6.85	19.24	12.31	7.46	10.79	13.03	12.92	29.01

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015
Biomass	112086	172735	93025	112247	151160	137964	155264	85691	106267
SD	13032	17696	10258	18089	29753	27395	29284	14019	13432
MCPT	141.82	193.67	106.59	134.33	172.05	155.11	176.26	108.50	121.19
SD	15.31	20.39	11.31	22.27	34.95	30.53	31.60	17.41	14.89

Table 15. American plaice length weight relationships in Spanish Spring Surveys in NAFO Div. 3NO: 2011-2015. E(x) means Error of the parameter x.

Males							Females						Indet.					
	a	b	E(a)	E(b)	R2	N	a	b	E(a)	E(b)	R2	N	a	b	E(a)	E(b)	R2	N
2011	0.00469	3.15597	0.0919	0.0276	0.997	557	0.0036	3.2453	0.0637	0.0181	0.998	1038	0.0039	3.2285	0.0613	0.0176	0.998	1597
2012	0.00525	3.13031	0.1089	0.0323	0.998	426	0.0039	3.2240	0.0907	0.025	0.999	715	0.0043	3.1992	0.0889	0.0243	0.999	1141
2013	0.01096	2.91169	0.2717	0.0846	0.972	609	0.0059	3.1190	0.1705	0.0477	0.987	987	0.0079	3.0398	0.1175	0.0342	0.992	1695
2014	0.00471	3.17431	0.0782	0.998	0.998	495	0.0044	3.2026	0.0679	0.0194	0.998	804	0.0046	3.1909	0.0742	0.0217	0.997	1338
2015	0.00585	3.09893	0.0495	0.0157	0.999	742	0.0036	3.2490	0.0439	0.0126	0.999	1105	0.0043	3.2033	0.062	0.018	0.998	1861

Table 16. American plaice mean number per tow by year in Spanish Spring Surveys in NAFO Div. 3NO: 1997-2015. Indet. means indeterminate.

1997					1998				1999				2000				2001			
Males	Females	Indet.	Total		Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total
MNPT	40.511	38.798	0.023	79.332	56.883	108.124	0.000	165.008	122.141	183.012	10.273	315.426	222.117	359.467	0.348	581.933	252.254	261.936	5.053	519.242
2002					2003				2004				2005				2006			
Males	Females	Indet.	Total		Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total
MNPT	149.083	175.044	0.319	324.447	245.522	236.752	0.407	482.682	206.765	241.817	64.714	513.296	279.087	280.604	2.603	562.294	443.600	423.144	0.191	866.936
2007					2008				2009				2010				2011			
Males	Females	Indet.	Total		Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total
MNPT	249.539	242.885	3.602	496.025	351.426	361.373	12.541	725.340	134.548	186.163	4.328	325.039	281.719	234.732	0.195	516.645	385.477	286.713	0.010	672.200
2012					2013				2014				2015							
Males	Females	Indet.	Total		Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total				
MNPT	350.620	246.778	0.684	598.083	376.247	261.170	3.239	640.655	172.242	155.876	0.596	328.714	241.001	182.255	0.633	423.888				

Table 17. American plaice mean number per tow by length class and year. Spanish Spring Survey in NAFO 3NO: 2011-2015. Indet. means indeterminate.

Lenght (cm)	2011				2012				2013				2014				2015			
	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total
2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.253	0.253	0.000	0.000	0.008	0.008	0.000	0.000	0.026	0.026
6	0.000	0.000	0.000	0.000	0.000	0.000	0.079	0.079	0.144	0.011	1.490	1.645	0.013	0.008	0.163	0.183	0.000	0.005	0.178	0.183
8	0.000	0.078	0.000	0.078	0.000	0.000	0.135	0.135	0.031	0.000	0.652	0.683	0.079	0.045	0.209	0.333	0.303	0.182	0.322	0.807
10	0.063	0.066	0.000	0.128	0.064	0.016	0.277	0.357	0.044	0.030	0.127	0.200	0.645	0.142	0.178	0.965	1.632	1.327	0.107	3.066
12	0.195	0.220	0.000	0.415	0.038	0.033	0.194	0.265	0.100	0.125	0.041	0.267	4.782	3.064	0.013	7.858	7.178	5.396	0.000	12.574
14	3.230	1.081	0.010	4.321	0.037	0.332	0.000	0.369	0.110	0.436	0.326	0.873	2.953	3.567	0.026	6.546	5.752	4.795	0.000	10.547
16	15.370	10.447	0.000	25.816	0.379	0.496	0.000	0.875	0.385	1.038	0.337	1.760	0.908	1.014	0.000	1.922	9.844	9.659	0.000	19.503
18	18.082	20.344	0.000	38.426	3.398	1.464	0.000	4.863	1.082	0.556	0.011	1.648	0.309	0.160	0.000	0.469	11.529	12.282	0.000	23.810
20	15.116	10.105	0.000	25.222	16.317	12.092	0.000	28.409	3.729	2.642	0.000	6.371	0.642	1.065	0.000	1.707	5.084	5.797	0.000	10.881
22	24.201	10.896	0.000	35.098	30.991	21.311	0.000	52.301	17.122	8.493	0.000	25.615	1.666	1.710	0.000	3.376	2.107	1.564	0.000	3.670
24	41.480	24.442	0.000	65.922	34.632	20.584	0.000	55.215	50.459	26.073	0.000	76.533	8.759	3.393	0.000	12.152	2.802	1.954	0.000	4.756
26	51.597	23.269	0.000	74.867	54.164	22.669	0.000	76.833	70.033	34.461	0.000	104.494	27.272	9.528	0.000	36.799	14.845	4.340	0.000	19.185
28	75.074	14.248	0.000	89.322	74.377	30.164	0.000	104.542	75.578	25.543	0.000	101.121	41.309	12.821	0.000	54.130	46.555	6.934	0.000	53.489
30	69.544	17.391	0.000	86.935	64.827	20.397	0.000	85.224	77.589	27.953	0.000	105.542	36.716	15.350	0.000	52.066	56.759	14.921	0.000	71.680
32	39.504	31.733	0.000	71.236	40.060	21.282	0.000	61.342	43.729	26.620	0.000	70.349	26.480	14.748	0.000	41.228	44.302	22.259	0.000	66.561
34	20.299	39.746	0.000	60.045	20.386	23.807	0.000	44.192	26.539	23.731	0.000	50.270	12.459	17.318	0.000	29.777	22.175	20.642	0.000	42.817
36	8.914	26.537	0.000	35.451	7.540	25.102	0.000	32.642	5.972	23.152	0.000	29.124	4.978	20.084	0.000	25.062	8.837	19.273	0.000	28.109
38	1.757	14.690	0.000	16.447	2.028	15.882	0.000	17.910	2.891	22.206	0.000	25.097	2.084	20.020	0.000	22.104	1.064	18.609	0.000	19.673
40	0.875	10.742	0.000	11.616	0.960	8.640	0.000	9.601	0.615	13.225	0.000	13.839	0.109	13.481	0.000	13.590	0.188	12.337	0.000	12.525
42	0.077	10.603	0.000	10.679	0.209	7.553	0.000	7.762	0.050	8.535	0.000	8.585	0.024	7.229	0.000	7.252	0.021	10.183	0.000	10.204
44	0.000	7.054	0.000	7.054	0.114	4.944	0.000	5.058	0.000	6.836	0.000	6.836	0.015	4.752	0.000	4.768	0.011	3.169	0.000	3.179
46	0.092	4.441	0.000	4.533	0.000	3.619	0.000	3.619	0.022	3.599	0.000	3.622	0.000	1.771	0.000	1.771	0.016	2.416	0.000	2.432
48	0.000	2.439	0.000	2.439	0.039	2.431	0.000	2.470	0.000	2.020	0.000	2.020	0.000	1.320	0.000	1.320	0.000	1.547	0.000	1.547
50	0.007	1.475	0.000	1.482	0.012	1.191	0.000	1.203	0.023	1.427	0.000	1.450	0.000	0.866	0.000	0.866	0.000	0.793	0.000	0.793
52	0.000	1.232	0.000	1.232	0.049	1.035	0.000	1.084	0.000	0.444	0.000	0.444	0.041	0.779	0.000	0.820	0.000	0.455	0.000	0.455
54	0.000	0.637	0.000	0.637	0.000	0.585	0.000	0.585	0.000	0.282	0.000	0.282	0.000	0.732	0.000	0.732	0.000	0.417	0.000	0.417
56	0.000	0.856	0.000	0.856	0.000	0.626	0.000	0.626	0.000	0.305	0.000	0.305	0.000	0.215	0.000	0.215	0.000	0.260	0.000	0.260
58	0.000	0.926	0.000	0.926	0.000	0.121	0.000	0.121	0.000	0.584	0.000	0.584	0.000	0.436	0.000	0.436	0.000	0.216	0.000	0.216
60	0.000	0.469	0.000	0.469	0.000	0.266	0.000	0.266	0.000	0.233	0.000	0.233	0.000	0.117	0.000	0.117	0.000	0.104	0.000	0.104
62	0.000	0.341	0.000	0.341	0.000	0.088	0.000	0.088	0.000	0.292	0.000	0.292	0.000	0.099	0.000	0.099	0.000	0.118	0.000	0.118
64	0.000	0.146	0.000	0.146	0.000	0.026	0.000	0.026	0.000	0.188	0.000	0.188	0.000	0.021	0.000	0.021	0.000	0.245	0.000	0.245
66	0.000	0.035	0.000	0.035	0.000	0.021	0.000	0.021	0.000	0.094	0.000	0.094	0.000	0.009	0.000	0.009	0.000	0.013	0.000	0.013
68	0.000	0.025	0.000	0.025	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.011	0.000	0.012	0.000	0.012	0.000	0.032	0.000	0.032
70	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.019	0.000	0.019	0.000	0.000	0.000	0.000	0.000	0.013	0.000	0.013
72	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
74	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
76	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	385.477	286.713	0.010	672.200	350.620	246.778	0.684	598.083	376.247	261.170	3.239	640.655	172.242	155.876	0.596	328.714	241.001	182.255	0.633	423.888
N° samples:				70				67				66				65				68
N° Ind.:	5295	7616	1	12912	4712	5894	37	10643	6627	7310	98	14035	4696	5066	49	9811	6727	6444	17	13188
Sampled catch:				3668				3067				4027				3316				4013
Range:				8-69				6-67				5-72				4-68				4-70
Total catch:				14415				13937				14575				9503				11756
Total hauls:				122				122				122				122				122

Table 18. American plaice mean number per tow by age, sex and year. Spanish Spring Survey in NAFO 3NO: 2011-2015. Indet. means indeterminate.

Age	2011				2012				2013				2014				2015			
	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total
1		0.08		0.08			0.68	0.68	0.08	0.01	2.44	2.52	0.02	0.05	0.25	0.32	0.04	0.19	0.20	0.43
2	4.51	1.91	0.00	6.42	0.11	0.21		0.32	0.33	0.24	0.15	0.72	0.81	1.67	0.24	2.73	4.35	1.67	0.43	6.45
3	46.51	37.72	0.01	84.24	2.02	1.94		3.96	0.16	0.63	0.28	1.07	8.61	5.40	0.09	14.10	30.99	29.61		60.61
4	45.42	25.50		70.92	33.17	25.18		58.35	7.69	4.16	0.30	12.15	7.42	2.18	0.01	9.61	9.59	10.05		19.64
5	77.52	39.25		116.78	47.78	23.62		71.40	94.09	38.48	0.07	132.64	5.31	4.38		9.69	12.10	1.76		13.86
6	103.49	33.67		137.16	114.42	53.55		167.96	104.24	56.26	0.00	160.50	42.75	18.20		60.94	65.55	11.54		77.09
7	75.62	52.47		128.10	84.64	40.56		125.20	124.59	58.25		182.84	42.54	24.96		67.50	103.99	53.47		157.46
8	24.96	57.45		82.41	50.29	34.16		84.46	34.41	30.40		64.82	37.89	36.75		74.63	12.96	26.04		39.00
9	6.20	8.63		14.83	12.38	37.15		49.52	8.83	33.12		41.94	16.95	25.31		42.27	1.35	26.39		27.75
10	1.10	8.87		9.97	5.20	12.44		17.64	0.97	20.80		21.77	6.45	15.96		22.41	0.06	10.93		10.99
11	0.13	8.63		8.76	0.37	6.61		6.98	0.84	7.33		8.17	3.45	11.41		14.86		6.05		6.05
12	0.00	6.35		6.36	0.07	5.03		5.10	0.02	5.21		5.23	0.02	3.62		3.64	0.00	2.09		2.10
13		2.18		2.18	0.05	2.62		2.67		2.62		2.62	0.02	1.70		1.71	0.00	0.70		0.71
14		0.90		0.90	0.08	1.58		1.65		1.31		1.31	0.02	1.86		1.88	0.00	0.38		0.38
15		0.35		0.35	0.05	0.34		0.39		0.61		0.61		1.12		1.12	0.00	0.23		0.23
16		0.76		0.76		0.79		0.79		0.52		0.52		0.38		0.38		0.10		0.10
17		0.91		0.91		0.64		0.64		0.32		0.32		0.53		0.53		0.37		0.37
18		0.29		0.29		0.20		0.20		0.48		0.48		0.23		0.23		0.07		0.07
19		0.56		0.56		0.07		0.07		0.13		0.13		0.11		0.11		0.16		0.16
20		0.16		0.16		0.08		0.08		0.11		0.11		0.04		0.04		0.07		0.07
21						0.01		0.01		0.19		0.19		0.02		0.02		0.24		0.24
22		0.07		0.07														0.06		0.06
23																				
24																		0.08		0.08
Total	385.5	286.7	0.01	672.2	350.6	246.8	0.684	598.1	376.2	261.2	3.239	640.7	172.2	155.9	0.596	328.7	241	182.3	0.633	423.9

Table 19. American plaice mean length (cm) per tow by age, sex and year. Spanish Spring Survey in NAFO 3NO: 2011-2015. Indet. means indeterminate.

Age	2011				2012				2013				2014				2015			
	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total
1		9.00		9.00			10.71	10.71	7.10	7.00	7.43	7.42	8.21	8.71	7.79	7.96	9.00	8.95	6.74	7.90
2	16.16	16.05	15.00	16.13	12.41	14.46		13.73	13.45	16.24	15.77	14.86	11.91	12.83	9.84	12.29	12.54	11.82	9.50	12.15
3	19.57	20.49	15.00	19.98	20.59	20.82		20.70	13.64	16.90	13.65	15.56	14.16	15.21	11.65	14.55	17.06	16.95		17.01
4	24.41	22.72		23.80	23.24	23.29		23.26	23.29	21.93	16.07	22.65	26.87	19.17	15.00	25.11	20.98	20.65		20.81
5	27.08	26.82		26.99	26.19	25.91		26.10	26.45	25.89	17.22	26.28	27.04	26.86		26.96	27.57	23.35		27.04
6	29.31	30.66		29.64	27.82	27.07		27.59	28.56	28.50	19.00	28.54	29.49	28.75		29.27	30.21	29.50		30.11
7	31.87	34.16		32.81	30.30	31.66		30.74	30.42	31.48		30.76	29.99	32.97		31.09	32.02	33.15		32.41
8	34.11	36.67		35.89	32.38	34.76		33.34	34.17	35.81		34.94	30.90	35.13		32.98	35.07	37.48		36.68
9	34.78	40.27		37.97	34.37	37.58		36.77	33.87	38.23		37.31	32.08	36.17		34.53	38.51	38.91		38.89
10	39.28	43.59		43.11	34.85	40.62		38.92	39.71	40.47		40.43	33.38	39.72		37.90	42.80	42.46		42.46
11	41.35	44.11		44.07	40.03	43.88		43.68	37.87	42.59		42.10	34.41	41.38		39.76		44.80		44.80
12	51.00	46.54		46.55	44.34	45.68		45.66	46.87	45.49		45.49	53.00	46.31		46.34	45.00	48.56		48.56
13		50.62		50.62	46.62	47.75		47.73		47.20		47.20	45.00	45.29		45.28	45.00	52.66		52.62
14		51.91		51.91	50.04	50.68		50.65		51.41		51.41	53.00	47.99		48.04	45.00	52.90		52.85
15		55.65		55.65	46.62	54.39		53.43		51.84		51.84		52.23		52.23	45.00	53.00		52.93
16		56.43		56.43		55.48		55.48		56.22		56.22		53.46		53.46		57.71		57.71
17		58.78		58.78		55.95		55.95		59.56		59.56		57.51		57.51		59.68		59.68
18		60.50		60.50		61.40		61.40		59.79		59.79		58.26		58.26		58.28		58.28
19		61.07		61.07		61.80		61.80		59.91		59.91		61.92		61.92		56.99		56.99
20		63.13		63.13		58.31		58.31		63.62		63.62		65.00		65.00		63.70		63.70
21						65.00		65.00		64.97		64.97		65.90		65.90		60.75		60.75
22		63.00		63.00														62.21		62.21
23																				
24																		65.00		65.00
Total	27.89	31.8	15	29.56	28.74	32.05	10.71	30.08	29.21	32.97	9.369	30.64	29.39	34.57	9.346	31.81	28.79	32.17	8.608	30.21

Table 20. American plaice mean weight (g) per tow by age, sex and year. Spanish Spring Survey in NAFO 3NO: 2011-2015. Indet. means indeterminate.

Age	2011				2012				2013				2014				2015			
	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total
1		5		5			9	9	3	3	4	4	4	5	4	4	5	5	2	3
2	31	31	24	31	15	22		19	27	37	37	32	14	16	7	15	16	12	6	14
3	59	71	24	64	68	70		69	22	45	23	36	22	29	12	25	42	39		41
4	116	100		111	102	104		103	107	95	37	101	168	66	26	144	79	72		75
5	161	165		162	152	147		151	154	155	45	154	170	175		172	173	104		164
6	204	252		216	181	170		178	194	210	61	200	224	215		222	229	222		228
7	265	354		301	234	275		247	234	289		251	236	334		272	275	324		291
8	326	445		409	286	377		323	323	425		371	263	411		336	364	478		440
9	349	597		494	347	474		443	318	519		477	292	453		388	481	539		537
10	513	767		739	357	608		534	498	618		612	329	594		518	673	712		712
11	596	808		805	551	778		766	437	730		700	359	672		600		850		850
12	1148	956		956	756	887		885	820	889		889	1400	974		977	777	1099		1098
13		1254		1254	883	1015		1012		990		990	833	903		902	777	1432		1428
14		1362		1362	1117	1237		1231		1306		1306	1400	1093		1096	777	1455		1451
15		1707		1707	883	1541		1460		1358		1358		1429		1429	777	1457		1450
16		1768		1768		1653		1653		1732		1732		1516		1516		1923		1923
17		2033		2033		1696		1696		2067		2067		1927		1927		2220		2220
18		2227		2227		2275		2275		2079		2079		1994		1994		2021		2021
19		2296		2296		2320		2320		2104		2104		2424		2424		1858		1858
20		2546		2546		1947		1947		2498		2498		2848		2848		2706		2706
21						2728		2728		2668		2668		2959		2959		2277		2277
22		2517		2517														2465		2465
23																				
24																		2827		2827
Total	189	348	24	257	206	334	9	259	211	370	11	275	234	438	7	330	221	375	5	287

Table 21. Atlantic cod mean catch (kg) and SD by stratum. Spanish Spring Surveys in NAFO Div. 3NO: 2011-2015. n.s. means stratum not surveyed.

[illegible]

Table 22. Atlantic cod survey biomass (t) by stratum in NAFO Div. 3NO: 2011-2015. n.s. means stratum not surveyed.

Strata	2011	2012	2013	2014	2015	Strata	2011	2012	2013	2014	2015
353	254	370	552	1381	1424	725	14	24	0	0	0
354	262	140	310	18564	3421	726	0	0	0	0	0
355	90	59	7	0	121	727	0	0	0	0	0
356	21	15	0	59	20	728	0	0	0	0	0
357	121	83	69	577	75	752	0	0	0	0	0
358	686	394	3284	48007	24557	753	0	0	0	0	0
359	13082	29009	3297	705820	6758	754	0	0	0	0	0
360	83252	17866	11568	614072	11888	755	0	0	0	0	0
374	14348	1995	152	58019	0	756	0	0	0	0	0
375	1401	1305	344	14788	115	757	0	0	0	0	0
376	558	194	1317	15180	2145	758	0	0	0	0	0
377	3961	6637	5792	75488	4729	759	0	0	0	0	0
378	891	265	837	276478	15897	760	0	0	0	0	0
379	165	28	42	1063	15	761	0	0	0	0	0
380	245	3147	0	4571	194	762	0	0	0	0	0
381	636	5664	2534	31200	4887	763	0	0	0	0	0
382	17315	20152	7786	4141	5505	764	0	0	0	0	0
721	0	28	0	0	28	765	0	0	0	0	0
722	0	0	0	71	0	766	0	0	0	0	0
723	74	61	53	462	0	767	0	0	0	0	0
724	0	0	0	0	0						

Table 23. Atlantic cod survey biomass (t) with SD and stratified mean catch per tow (kg) and SD by in NAFO Div. 3NO: 1997-2015.

Year	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Biomass	2131	19444	3054	7576	32548	10502	5455	3712	4509	19921
SD	1322	18206	655	2566	15903	7971	3016	848	1984	8109
MCPT	2.50	19.47	3.50	8.46	36.96	11.07	5.93	4.09	5.06	23.35
SD	1.54	17.82	0.75	2.58	17.97	7.82	3.29	0.95	2.16	9.39

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015
Biomass	10592	23817	72757	76856	137378	87436	37945	143299	81780
SD	5853	5221	40466	37369	54393	30292	5114	54386	28297
MCPT	13.47	26.55	80.73	90.96	155.16	97.02	43.33	180.81	92.64
SD	7.44	5.71	46.81	43.41	64.42	32.90	5.90	67.34	32.30

Table 24. Atlantic cod length weight relationships in Spanish Spring Surveys in NAFO Div. 3NO: 2011-2015. E(x) means Error of the parameter x.

	a	b	E(a)	E(b)	R²	N
2011	0.00471	3.13897	0.0594	0.015	0.998	1541
2012	0.00571	3.09345	0.1091	0.0273	0.994	768
2013	0.00586	3.09132	0.067	0.017	0.997	1853
2014	0.00434	3.16276	0.0551	0.0139	0.998	2554
2015	0.00514	3.11990	0.0452	0.0116	0.999	2733

Table 25. Atlantic cod mean number per tow by year in Spanish Spring Surveys in NAFO Div. 3NO: 1997-2015. Indet. means indeterminate.

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
MNPT	1.997	12.378	8.847	9.220	41.290	12.930	4.684	9.035	9.005	40.718
	2007	2008	2009	2010	2011	2012	2013	2014	2015	
MNPT	32.605	49.717	131.444	118.451	139.982	79.685	26.421	82.688	83.149	

Table 26. Atlantic cod mean number per tow by length class and year. Spanish Spring Survey in NAFO 3NO: 2011-2015.

Lenght (cm.)	2011	2012	2013	2014	2015
	Total	Total	Total	Total	Total
6	0.000	0.000	0.000	0.000	0.039
8	0.000	0.000	0.014	0.000	0.013
10	0.026	0.000	0.000	0.027	0.026
12	0.026	0.012	0.143	0.058	0.091
14	0.013	0.037	0.165	0.048	0.229
16	0.026	0.049	0.217	0.105	0.358
18	0.000	0.024	0.089	0.165	0.179
20	0.025	0.012	0.055	0.203	0.142
22	0.060	0.034	0.020	0.308	0.711
24	0.110	0.019	0.054	0.233	2.836
26	0.167	0.059	0.081	0.528	4.258
28	0.240	0.089	0.119	0.469	3.838
30	0.118	0.264	0.175	0.510	2.722
32	0.732	0.555	0.256	0.501	3.328
34	2.015	0.801	0.322	0.969	5.313
36	3.541	1.047	0.407	1.135	7.129
38	5.037	2.665	0.858	1.131	4.582
40	5.450	4.911	1.195	1.585	4.773
42	7.059	6.423	1.493	1.575	4.396
44	16.735	6.058	1.789	2.098	4.105
46	20.782	5.256	1.765	2.377	3.406
48	19.274	7.065	1.749	3.219	2.181
50	17.802	7.811	1.664	3.263	3.019
52	12.962	7.273	1.770	3.855	2.460
54	7.130	7.583	1.686	4.588	2.697
56	4.865	6.798	1.522	4.616	2.535
58	3.304	5.188	1.583	4.332	2.458
60	1.725	3.408	1.340	4.987	2.265
62	2.314	1.889	1.226	5.393	1.677
64	1.340	1.106	0.809	5.866	1.953
66	1.239	0.639	0.706	5.383	1.390
68	1.276	0.612	0.446	4.021	1.096
70	1.359	0.492	0.272	4.384	1.084
72	0.745	0.208	0.369	3.238	1.099
74	0.345	0.352	0.251	2.517	0.804
76	0.388	0.249	0.174	2.456	0.566
78	0.373	0.145	0.161	1.425	0.502
80	0.313	0.063	0.198	0.967	0.549
82	0.283	0.055	0.133	0.934	0.498
84	0.173	0.059	0.194	0.957	0.408
86	0.136	0.054	0.143	0.350	0.331
88	0.114	0.063	0.126	0.456	0.237
90	0.090	0.091	0.110	0.420	0.114
92	0.039	0.060	0.114	0.224	0.199
94	0.072	0.012	0.087	0.186	0.197
96	0.026	0.021	0.084	0.331	0.125
98	0.025	0.036	0.061	0.085	0.044
100	0.013	0.000	0.092	0.078	0.088
102	0.013	0.020	0.050	0.052	0.026
104	0.000	0.005	0.039	0.026	0.027
106	0.013	0.000	0.000	0.000	0.000
108	0.000	0.000	0.005	0.013	0.031
110	0.013	0.008	0.027	0.012	0.013
112	0.000	0.000	0.000	0.000	0.000
114	0.043	0.000	0.000	0.000	0.000
116	0.013	0.000	0.000	0.000	0.000
118	0.000	0.000	0.000	0.000	0.000
120	0.000	0.000	0.014	0.013	0.000
122	0.000	0.000	0.000	0.012	0.000
124	0.000	0.000	0.000	0.000	0.000
126	0.000	0.000	0.000	0.000	0.000
128	0.000	0.000	0.000	0.000	0.000
130	0.000	0.000	0.000	0.000	0.000
132	0.000	0.000	0.000	0.000	0.000
Total	139,982	79,685	26,421	82,688	83,149
Nº samples:	64	57	57	55	61
Nº Ind.:	5197	5107	3571	4700	4728
Sampled catch:	6381	6371	5251	8988	7607
Range:	10-116	13-110	9-120	10-122	6-110
Total catch:	15136	13497	5434	23952	12477
Total hauls:	122	122	122	122	122

Table 27. Atlantic cod mean number per tow by age and year. Spanish Spring Survey in NAFO 3NO: 2011-2015.

Age	2011	2012	2013	2014	2015
1	0.16	0.14	0.67	0.15	0.96
2	1.04	0.58	0.46	2.51	13.89
3	17.25	9.74	1.86	5.00	23.68
4	13.57	19.04	7.13	8.10	14.29
5	92.17	4.81	4.20	31.29	5.04
6	3.00	38.65	1.06	12.21	10.62
7	8.98	4.19	9.26	1.53	4.45
8	3.38	1.86	0.23	16.69	1.26
9	0.22	0.55	0.91	1.93	8.29
10	0.02	0.06	0.58	2.53	0.21
11	0.04	0.04	0.05	0.70	0.36
12	0.09	0.01	0.00	0.01	0.09
13	0.06	0.02		0.01	0.01
14	0.01	0.01	0.01	0.01	
15					
16					
17					
18					
19					
20					
Total	139.98	79.69	26.42	82.69	83.15

Table 28. Atlantic cod mean length (cm) per tow by age and year. Spanish Spring Survey in NAFO 3NO: 2011-2015.

Age	2011	2012	2013	2014	2015
1	30.18	16.90	16.10	13.86	15.98
2	40.31	31.15	28.64	26.29	27.61
3	46.63	40.56	38.43	38.44	36.90
4	49.70	46.22	46.44	47.42	44.63
5	56.02	53.15	51.81	58.26	52.27
6	64.34	54.56	53.11	62.97	59.86
7	71.67	56.10	61.16	73.54	61.79
8	84.98	70.19	71.43	72.87	64.69
9	88.82	80.76	84.43	73.76	69.76
10	95.87	80.63	93.60	83.93	88.22
11	99.54	96.45	92.49	92.39	90.55
12	109.24	89.50	109.50	122.50	92.05
13	95.50	99.19		103.50	103.50
14		104.50	110.50	120.50	
15					
16					
17					
18					
19					
20					
Total	49.80	51.21	53.77	60.34	45.76

Table 29. Atlantic cod mean weight (g) per tow by age and year. Spanish Spring Survey in NAFO 3NO: 2011-2015.

Age	2011	2012	2013	2014	2015
1	45	38	34	19	33
2	215	247	194	146	165
3	532	553	479	460	408
4	830	833	865	898	740
5	1024	1277	1211	1730	1220
6	1488	1397	1359	2207	1914
7	2382	1516	2046	3546	2191
8	3273	3073	3417	3470	2544
9	5515	4748	5454	3667	3142
10	6153	4803	7531	5430	6493
11	8549	7888	7143	7245	6788
12	8967	6229	11820	17443	7061
13	12108	8630		10236	9937
14	7724	10059	12157	16558	
15					
16					
17					
18					
19					
20					
Total	1108	1218	1640	2187	1114

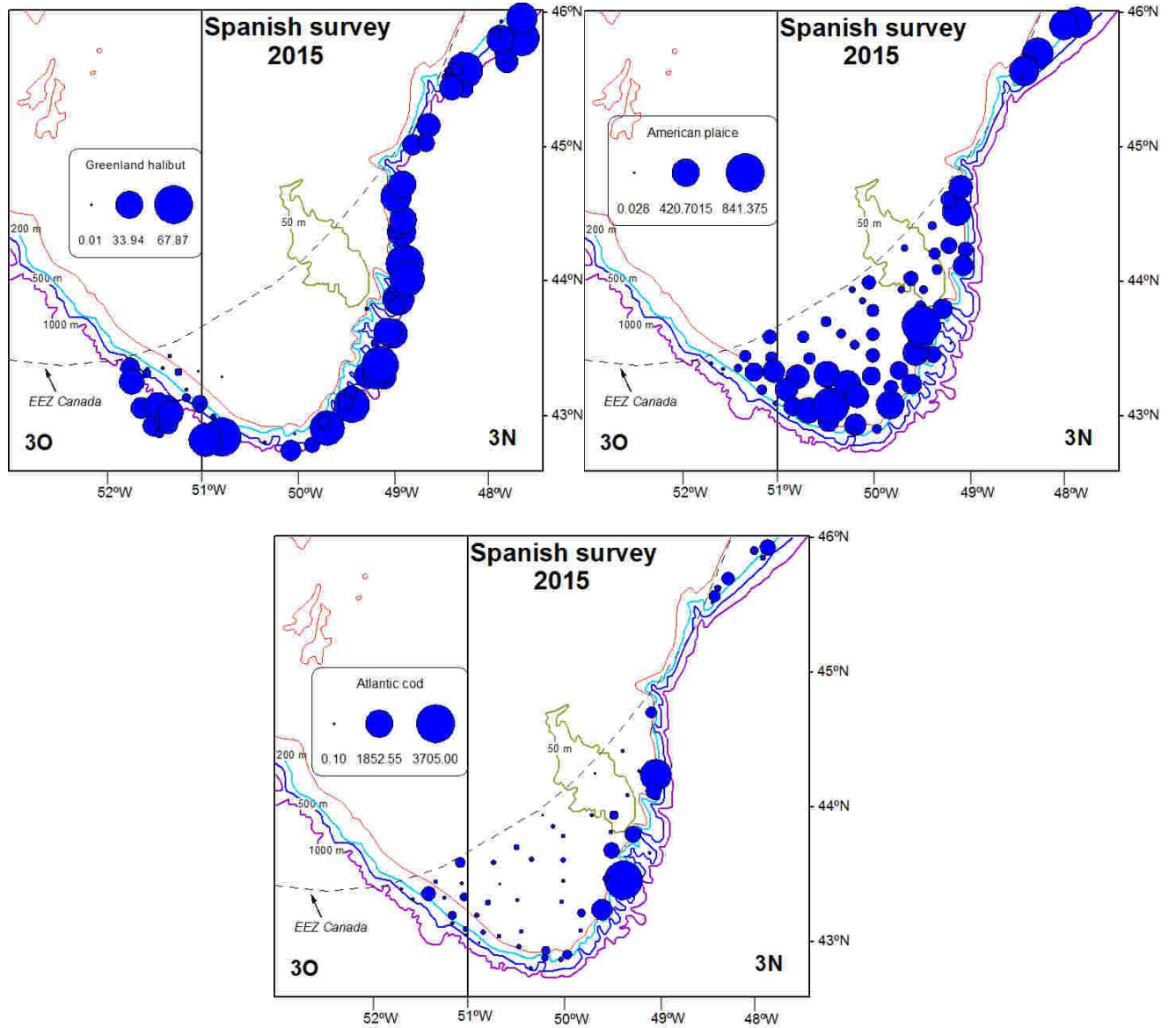


Fig. 1. Position of the hauls and the catch of Greenland halibut, American plaice and Atlantic cod during the 2015 Spanish 3NO survey. Note that the scale is different in the three graphs.

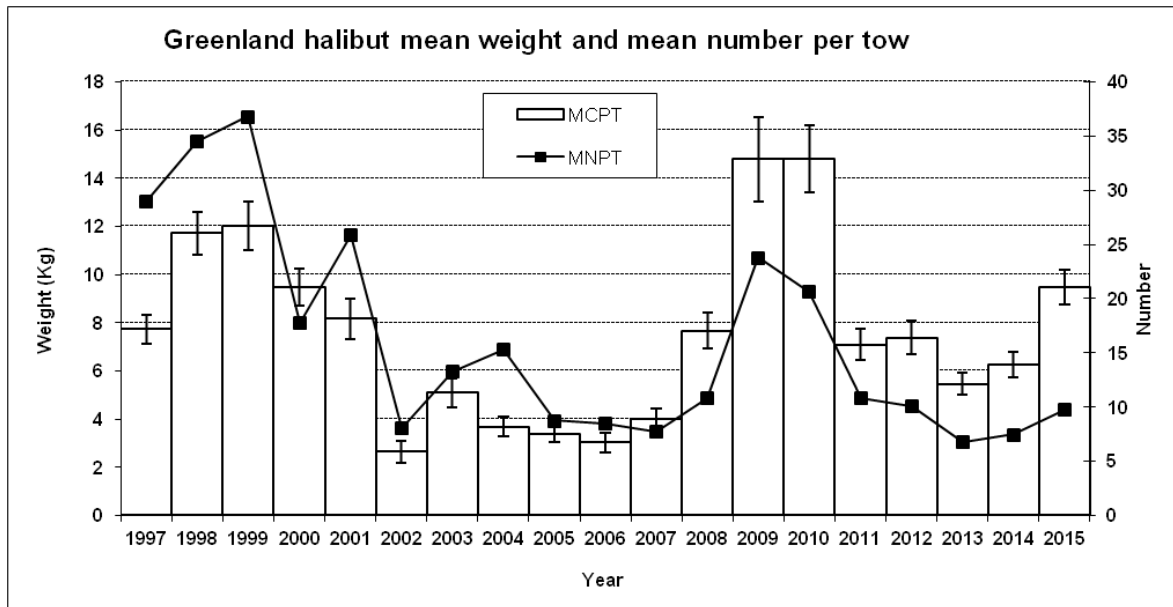


Fig. 2. Greenland halibut stratified mean catches in Kg and \pm SD by year and mean number by year. Spanish Spring surveys in NAFO Div. 3NO: 1997-2015.

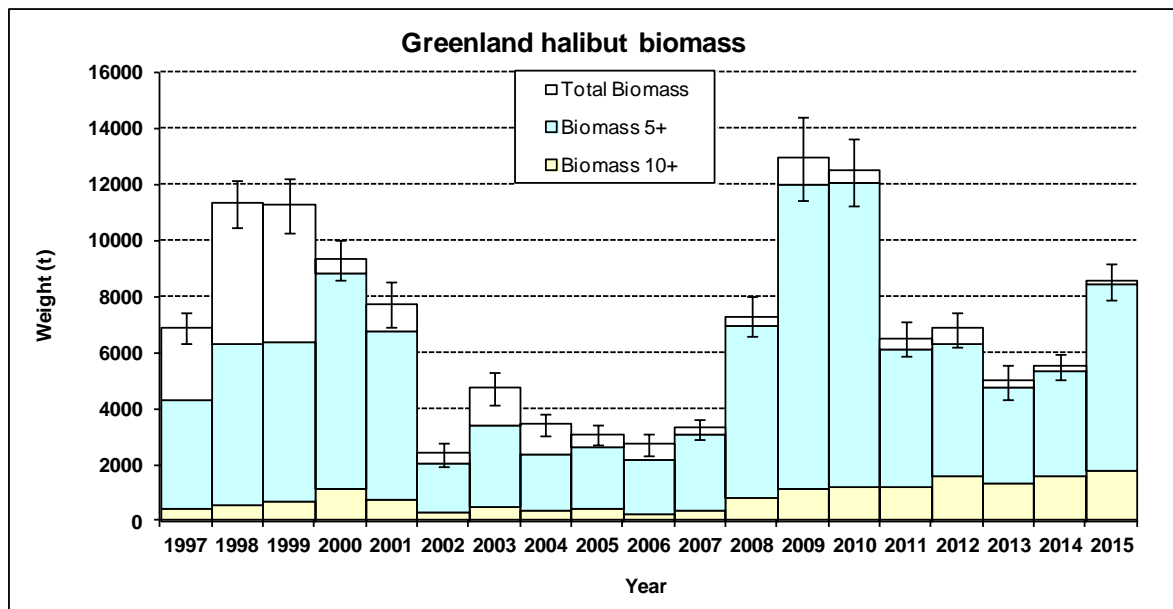


Fig. 3 Greenland halibut biomass calculated by the swept area method in tons and \pm SD by year. Spanish Spring surveys in NAFO Div. 3NO: 1997-2015.

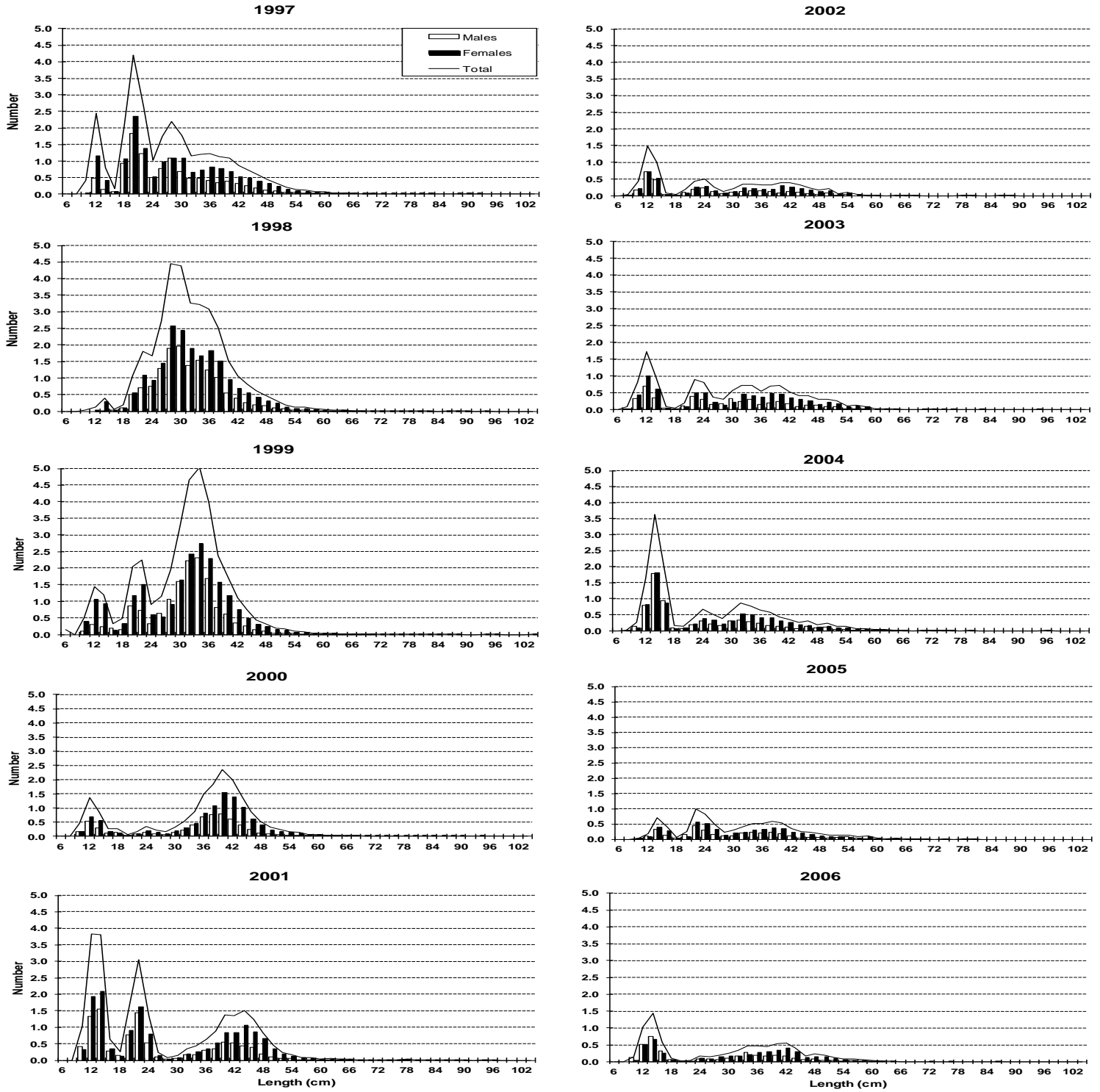


Fig. 4. Greenland halibut length distribution (cm) on NAFO 3NO: 1997-2015. Mean catches per tow number. Data from 2011 to 2015 are in Table 8; data for 1997-2010 can be seen in SCR Doc 13/10.

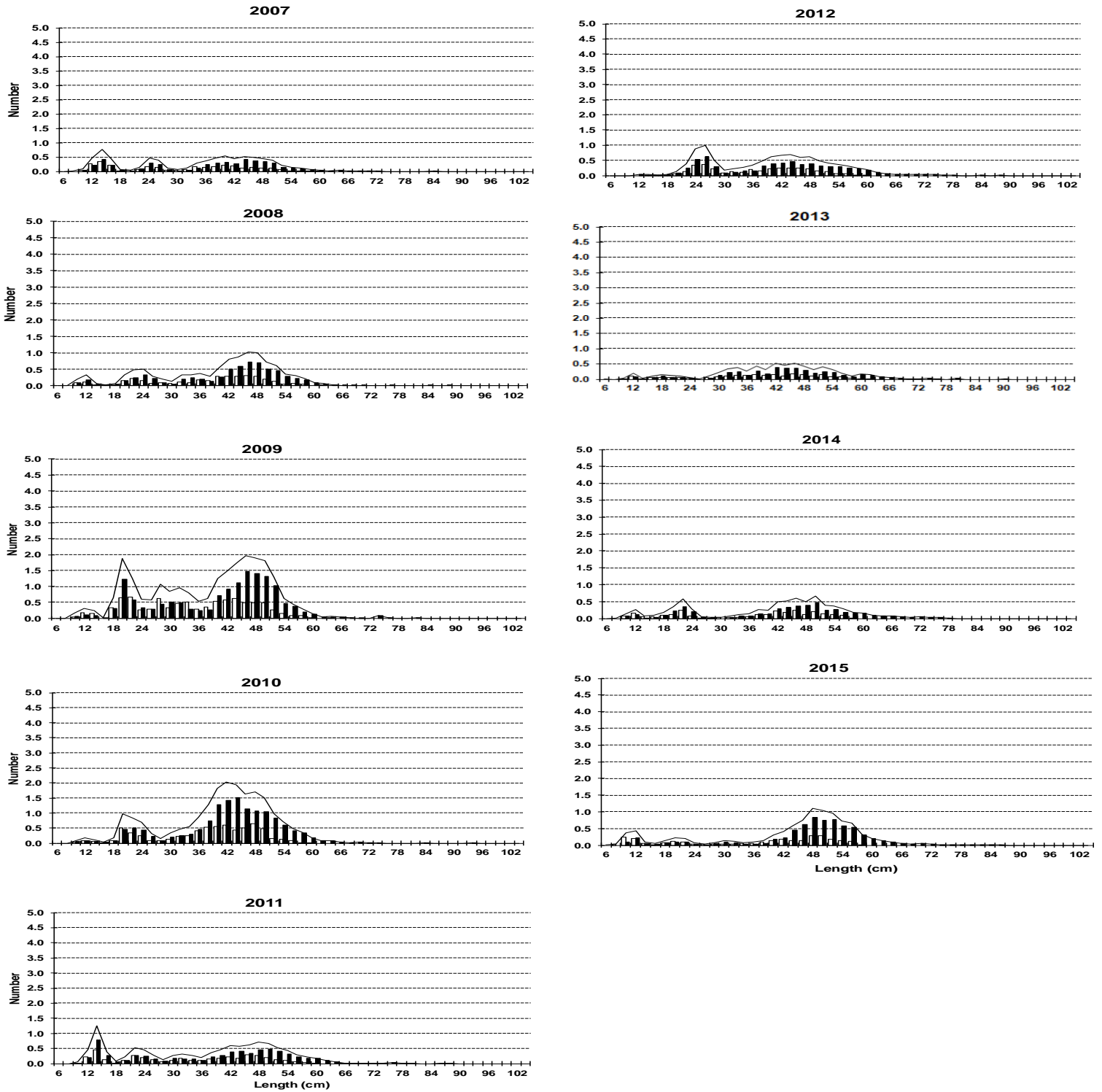


Fig. 4 (cont.). Greenland halibut length distribution (cm) on NAFO 3NO: 1997-2015. Mean catches per tow number. Data from 2011 to 2015 are in Table 8; data for 1997-2010 can be seen in SCR Doc 13/10.

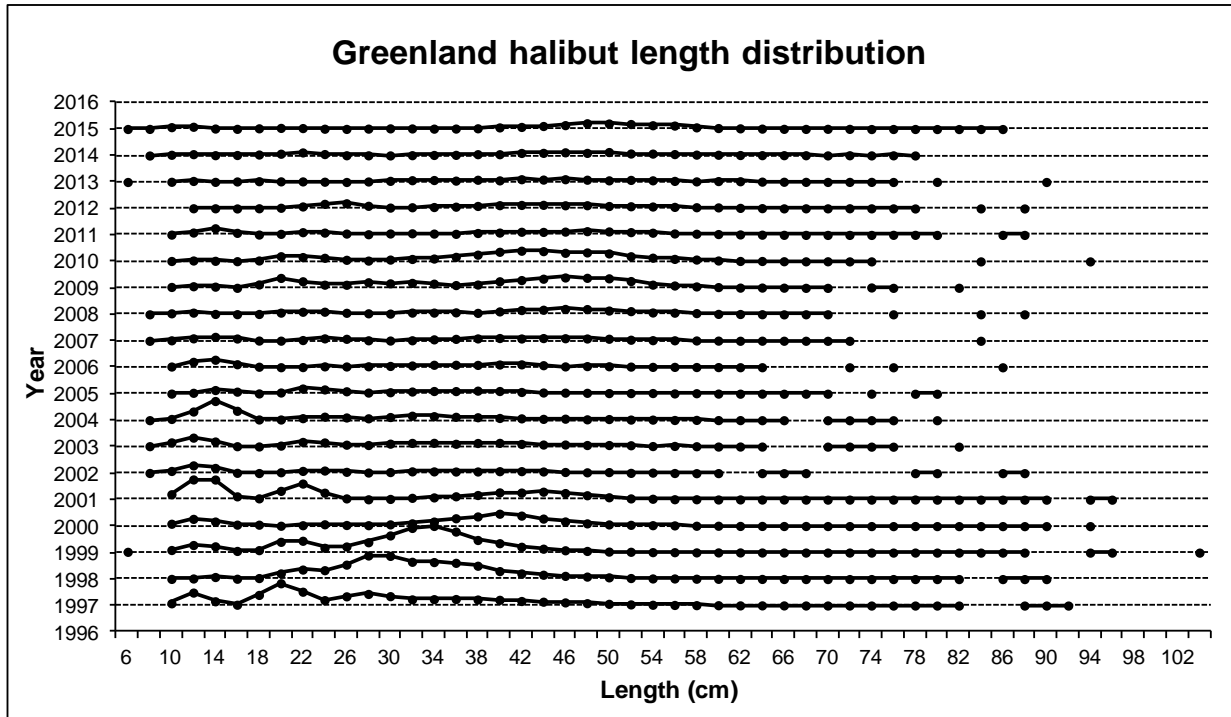


Fig. 5. Greenland halibut mean number per tow by length (cm) on NAFO 3NO: 1997-2015. Data from 2011 to 2015 are in Table 8; data for 1997-2010 can be seen in SCR Doc 13/10.

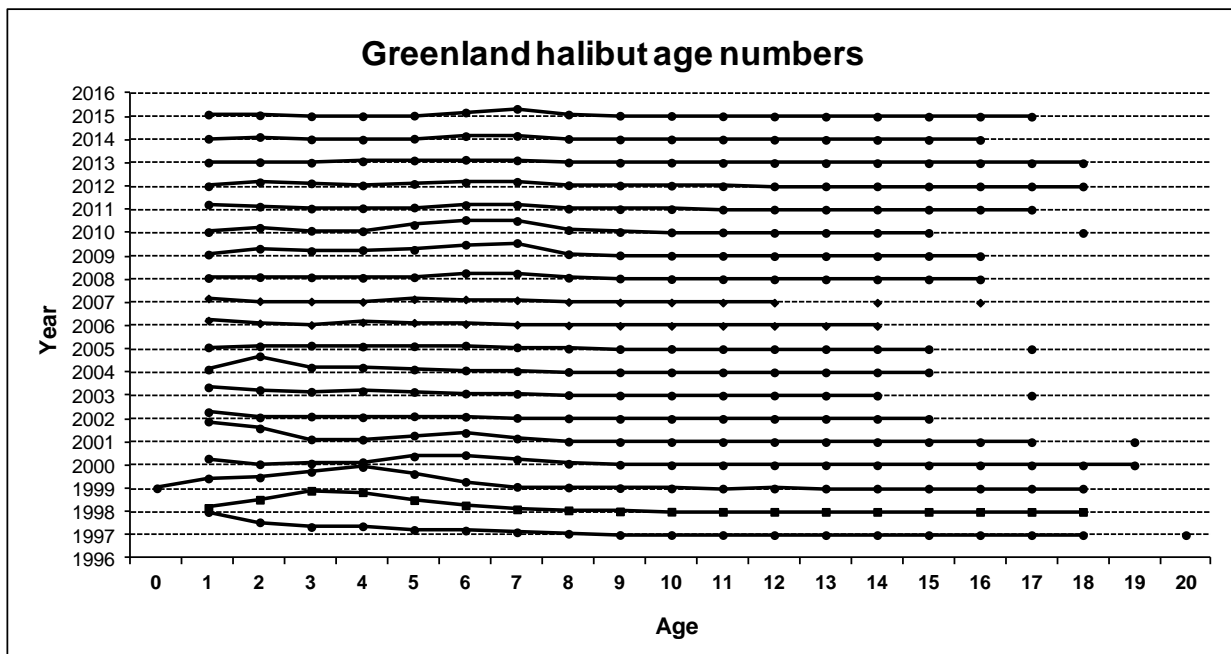


Fig. 6. Greenland halibut mean numbers per tow by age on NAFO 3NO: 1997-2015. Data from 2011 to 2015 are in Table 9; data for 1997-2010 can be seen in SCR Doc 13/10.

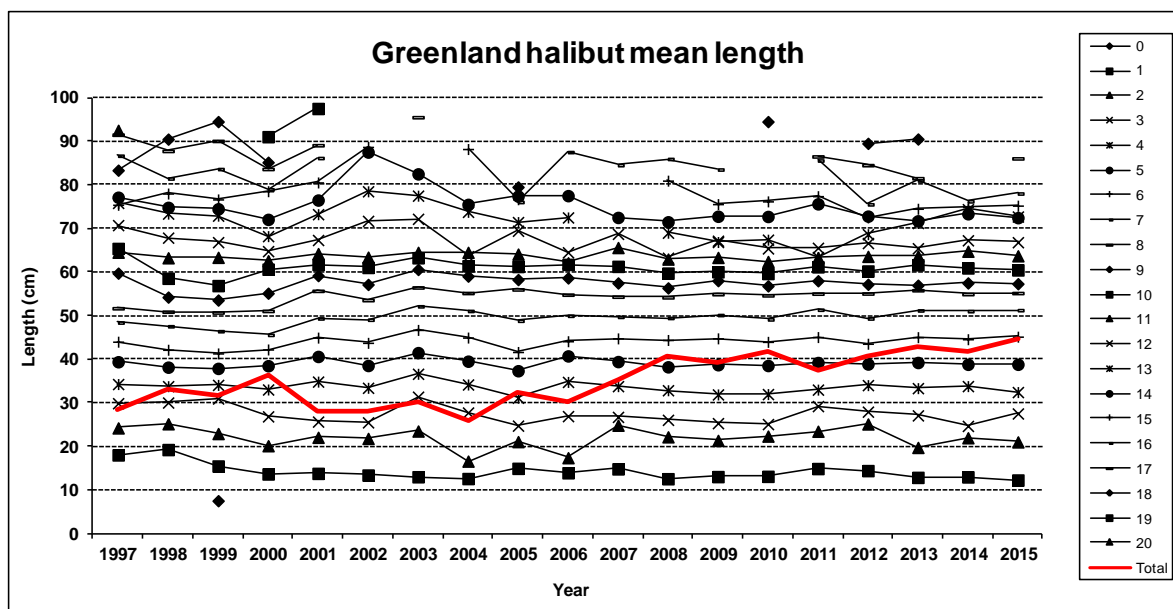


Fig. 7. Greenland halibut mean length (cm) at age on NAFO 3NO: 1997-2015. Data from 2011 to 2015 are in Table 10; data for 1997-2010 can be seen in SCR Doc 13/10.

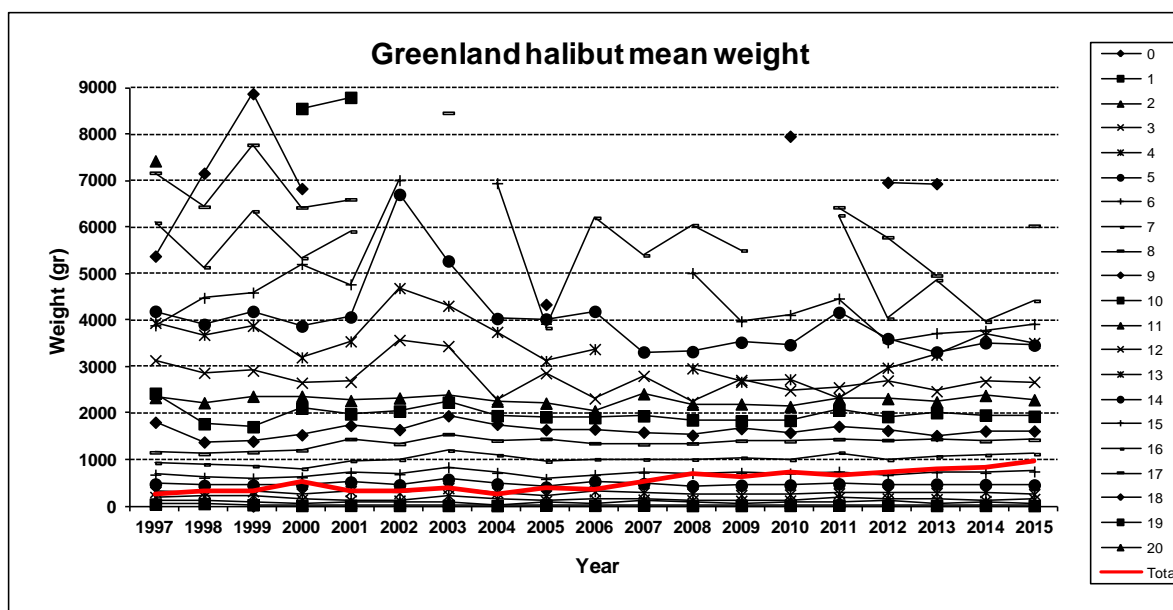


Fig. 8. Greenland halibut mean weight (gr) at age on NAFO 3NO: 1997-2015. Data from 2011 to 2015 are in Table 11; data for 1997-2010 can be seen in SCR Doc 13/10.

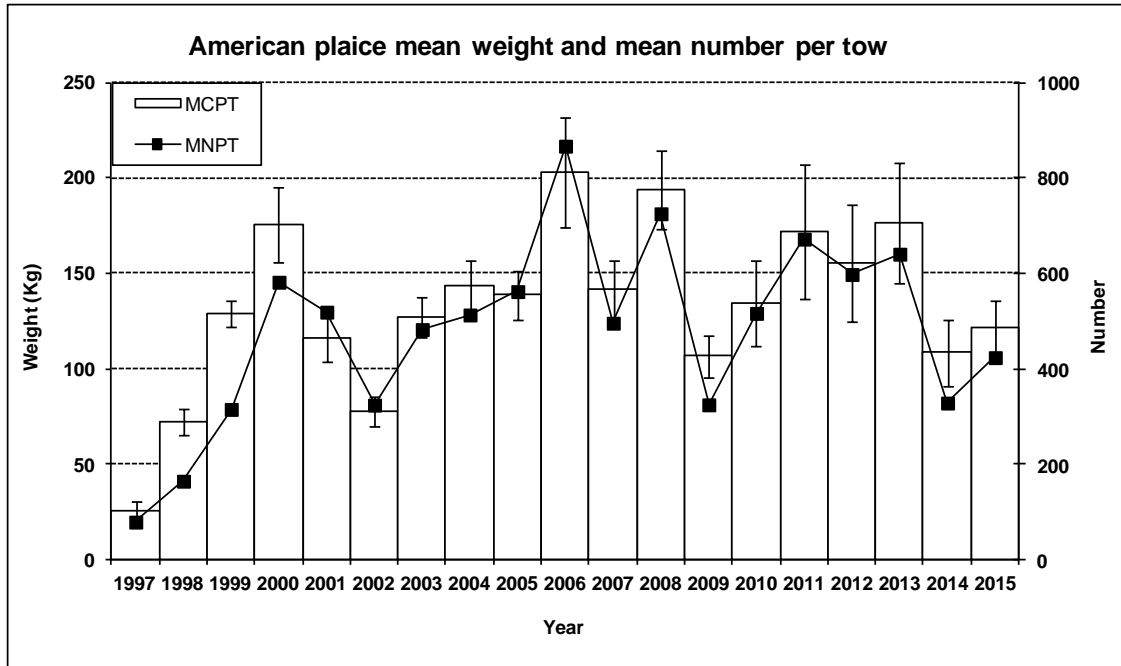


Fig. 9. American plaice stratified mean catches in Kg and \pm SD by year and mean number by year. Spanish Spring surveys in NAFO Div. 3NO: 1997-2015.

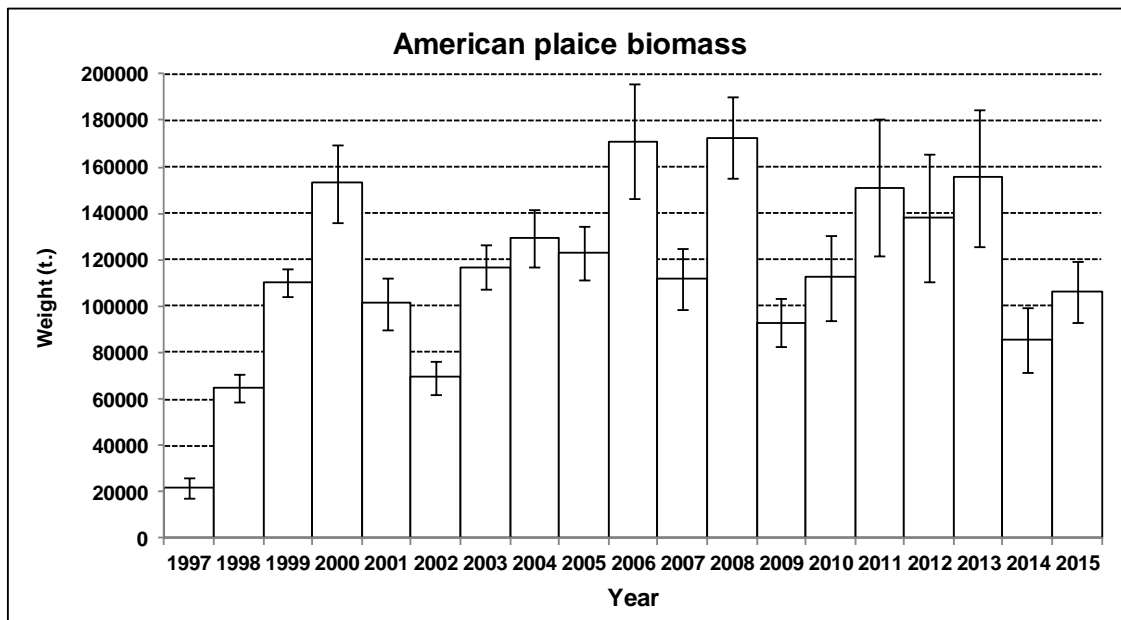


Fig. 10. American plaice biomass calculated by the swept method in tons and \pm SD by year. Spanish Spring surveys in NAFO Div. 3NO: 1997-2015.

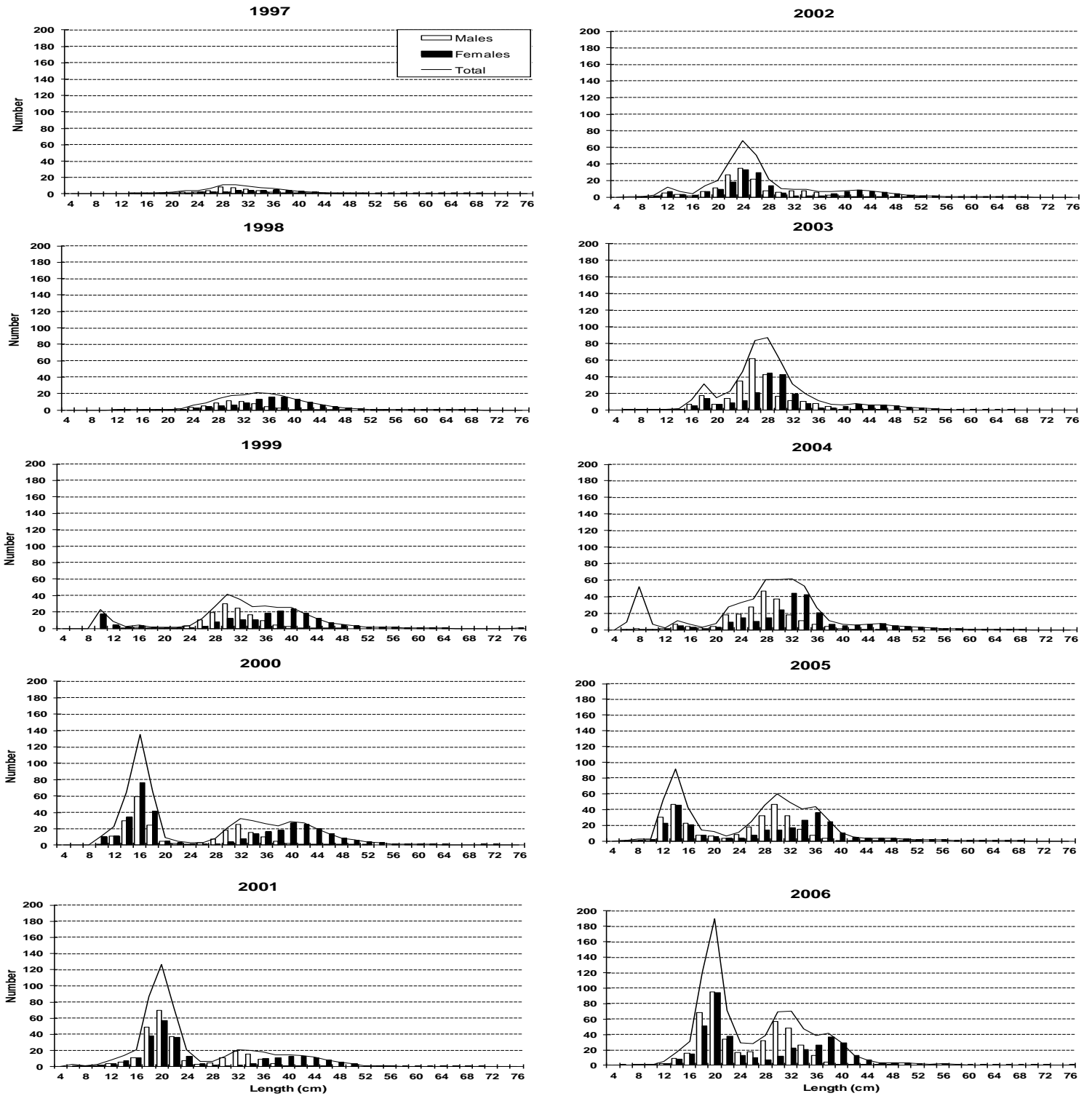


Fig. 11. American plaice length distribution (cm) on NAFO 3NO: 1997-2015. Mean catches per tow number. Data from 2011 to 2015 are in Table 17; data for 1997-2010 can be seen in SCR Doc 13/10.

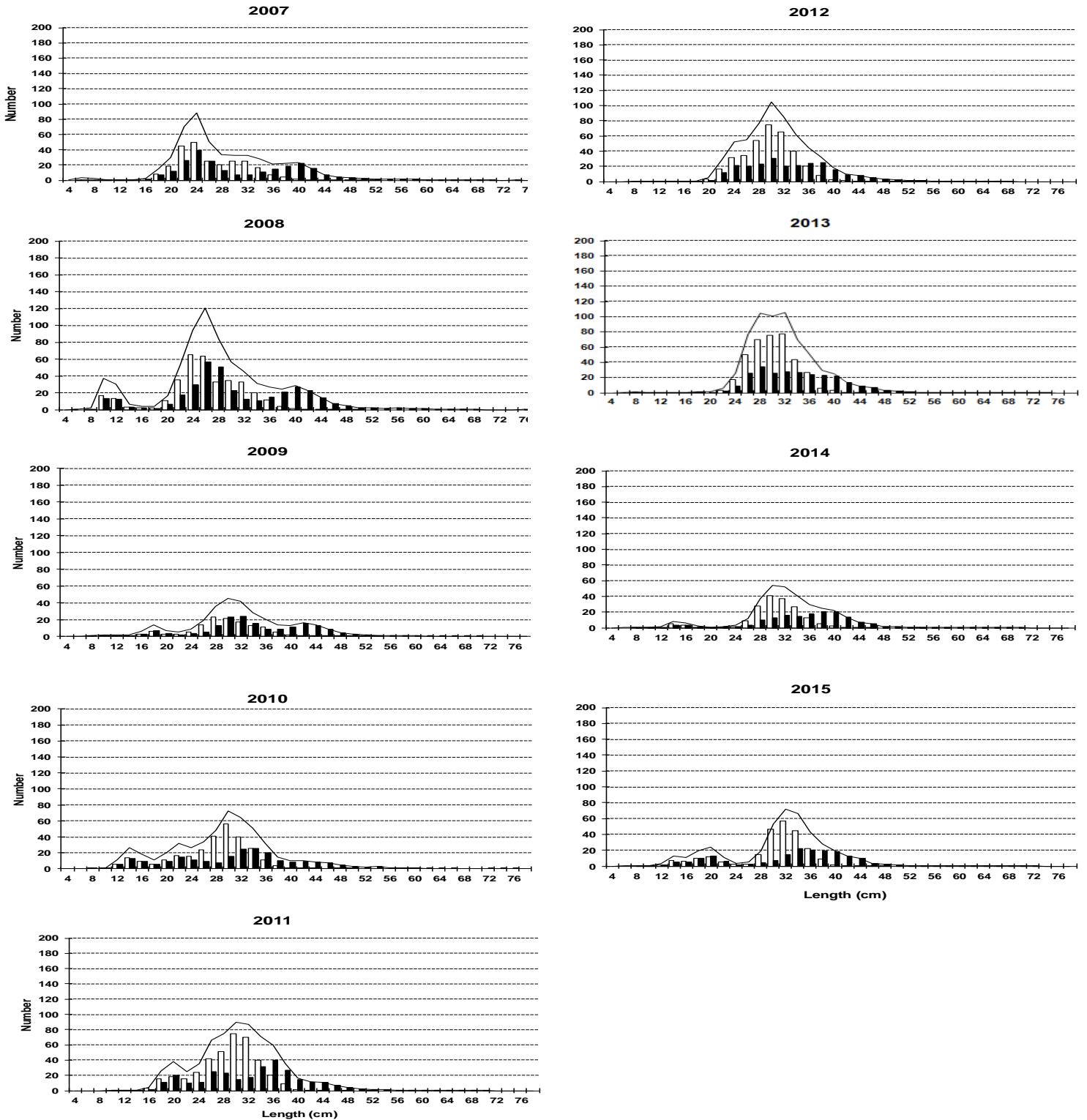


Fig.11 (cont.). American plaice length distribution (cm) on NAFO 3NO: 1997-2015. Mean catches per tow number. Data from 2011 to 2015 are in Table 17; data for 1997-2010 can be seen in SCR Doc 13/10.

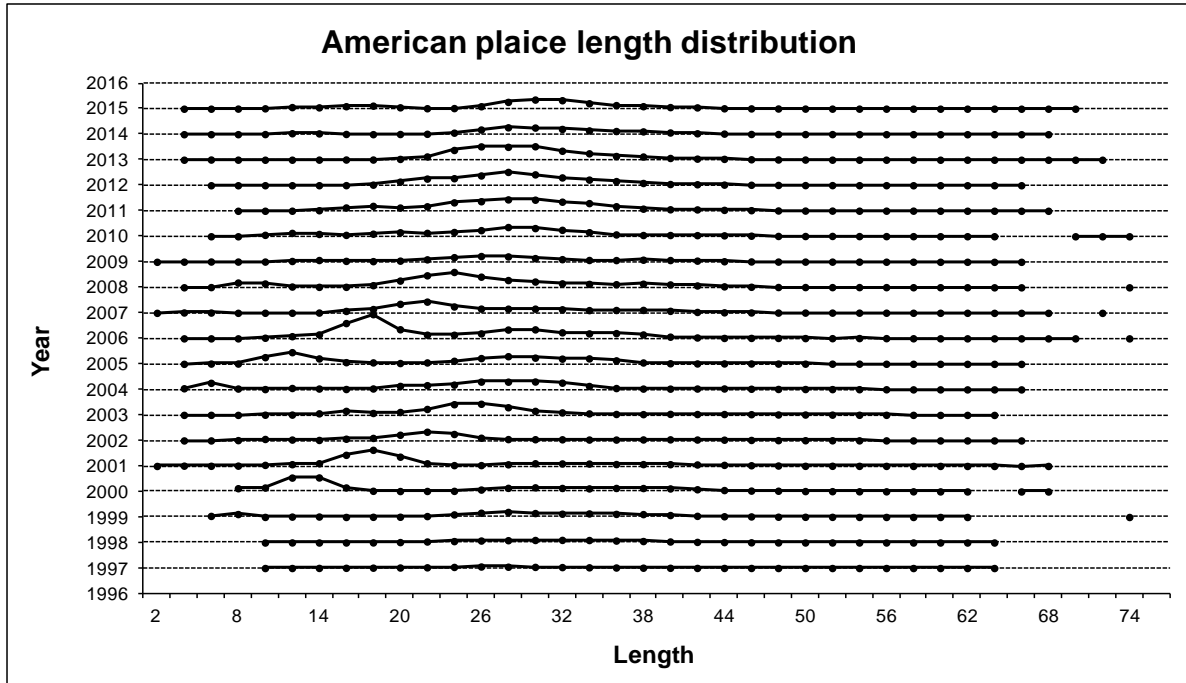


Fig.12. American plaice mean catches per tow by length (cm) on NAFO 3NO: 1997-2015. Data from 2011 to 2015 are in Table 17; data for 1997-2010 can be seen in SCR Doc 13/10.

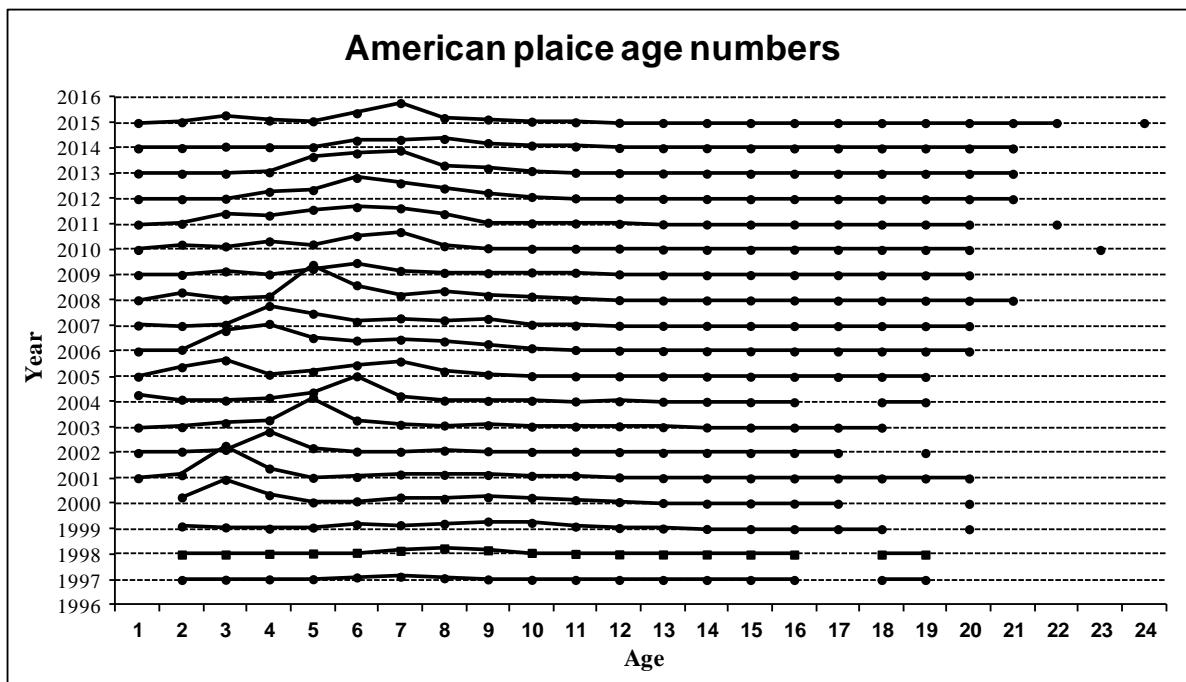


Fig. 13. American plaice mean catches per tow by age on NAFO 3NO: 1997-2015. Data from 2011 to 2015 are in Table 18; data for 1997-2010 can be seen in SCR Doc 13/10.

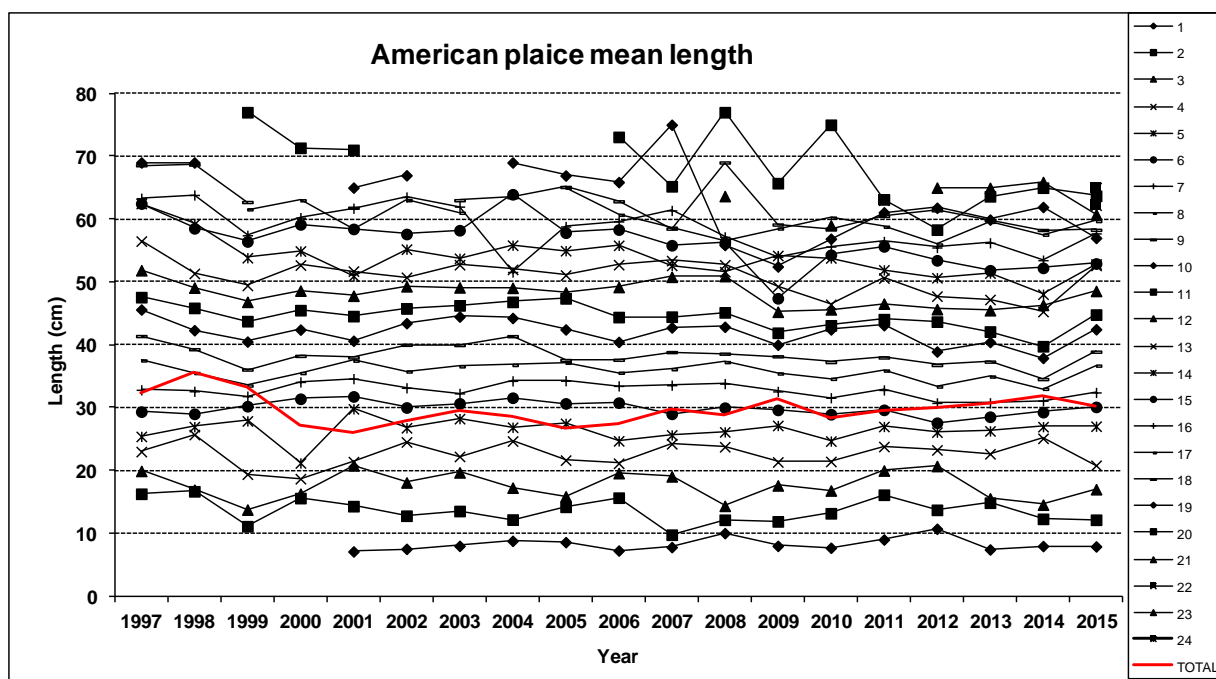


Fig. 14. American plaice mean length (cm) at age on NAFO 3NO: 1997-2015. Data from 2011 to 2015 are in Table 19; data for 1997-2010 can be seen in SCR Doc 13/10.

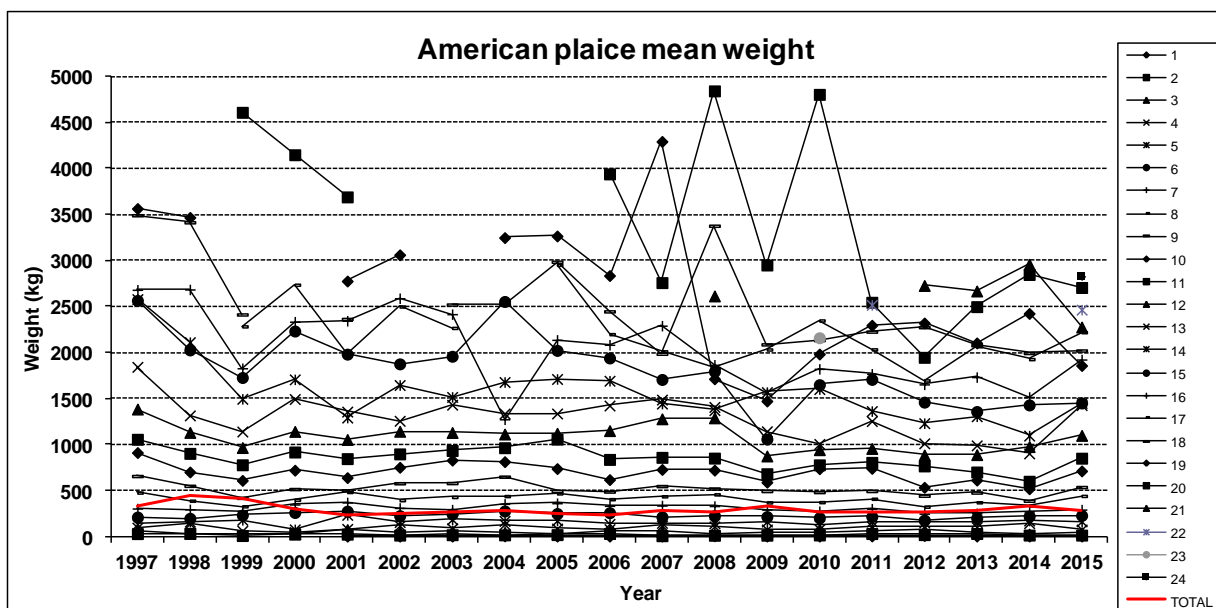


Fig. 15. American plaice mean weight (gr) at age on NAFO 3NO: 1997-2015. Data from 2011 to 2015 are in Table 20; data for 1997-2010 can be seen in SCR Doc 13/10.

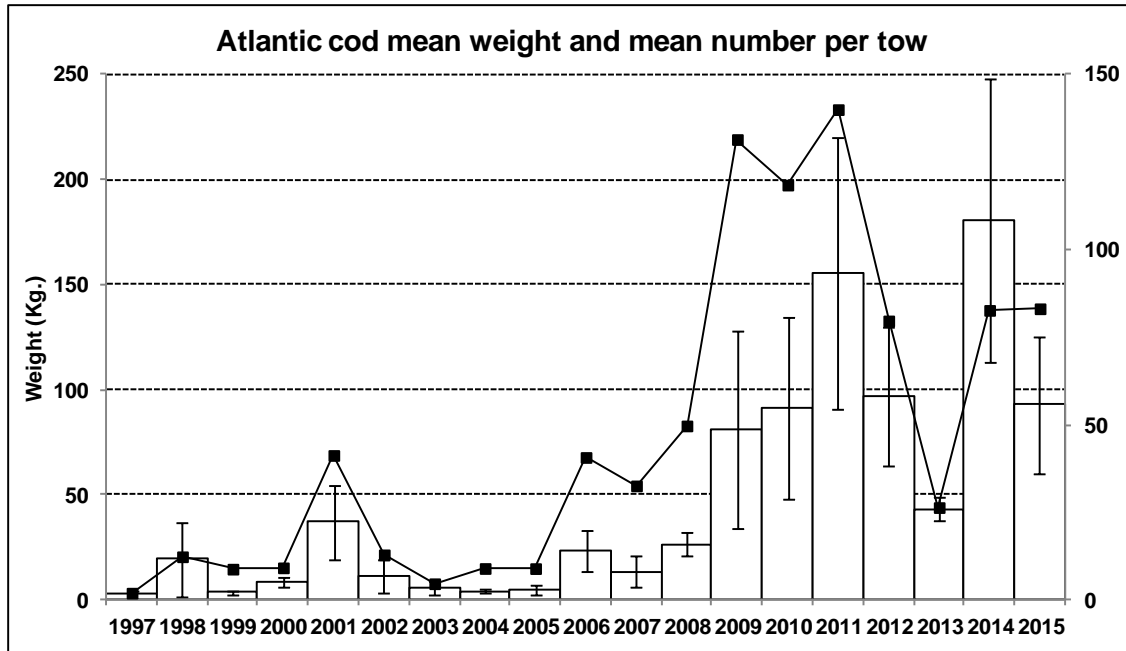


Fig. 16. Atlantic cod stratified mean catches in Kg and \pm SD by year and mean number by year. Spanish Spring surveys in NAFO Div. 3NO: 1997-2015.

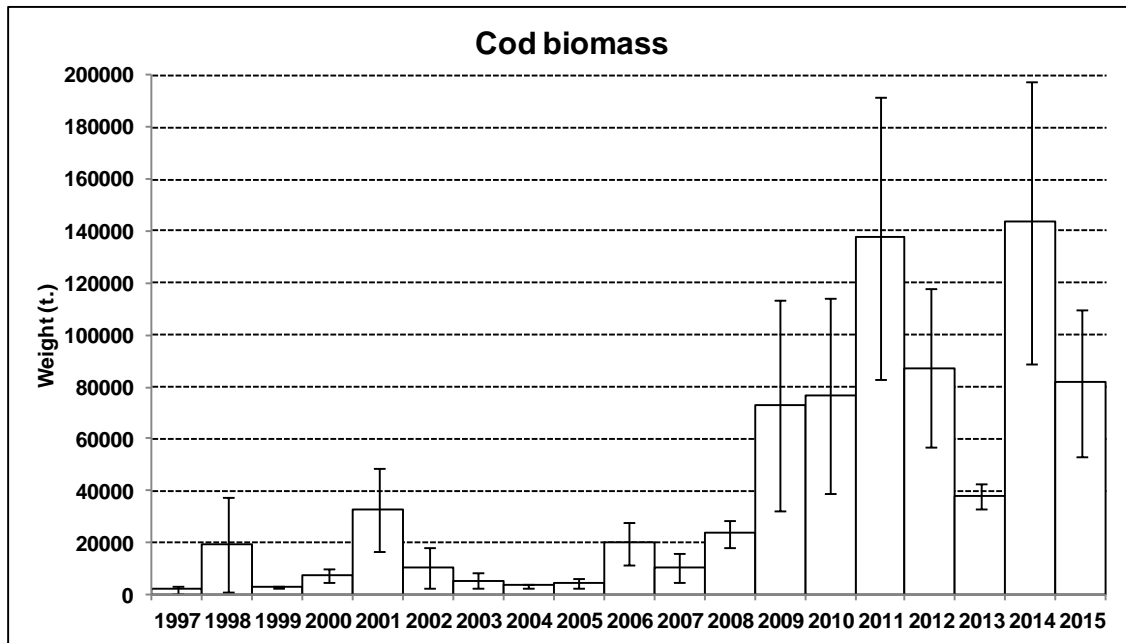


Fig. 17. Atlantic cod biomass calculated by the swept method in tons and \pm SD by year. Spanish Spring surveys in NAFO Div. 3NO: 1997-2015.

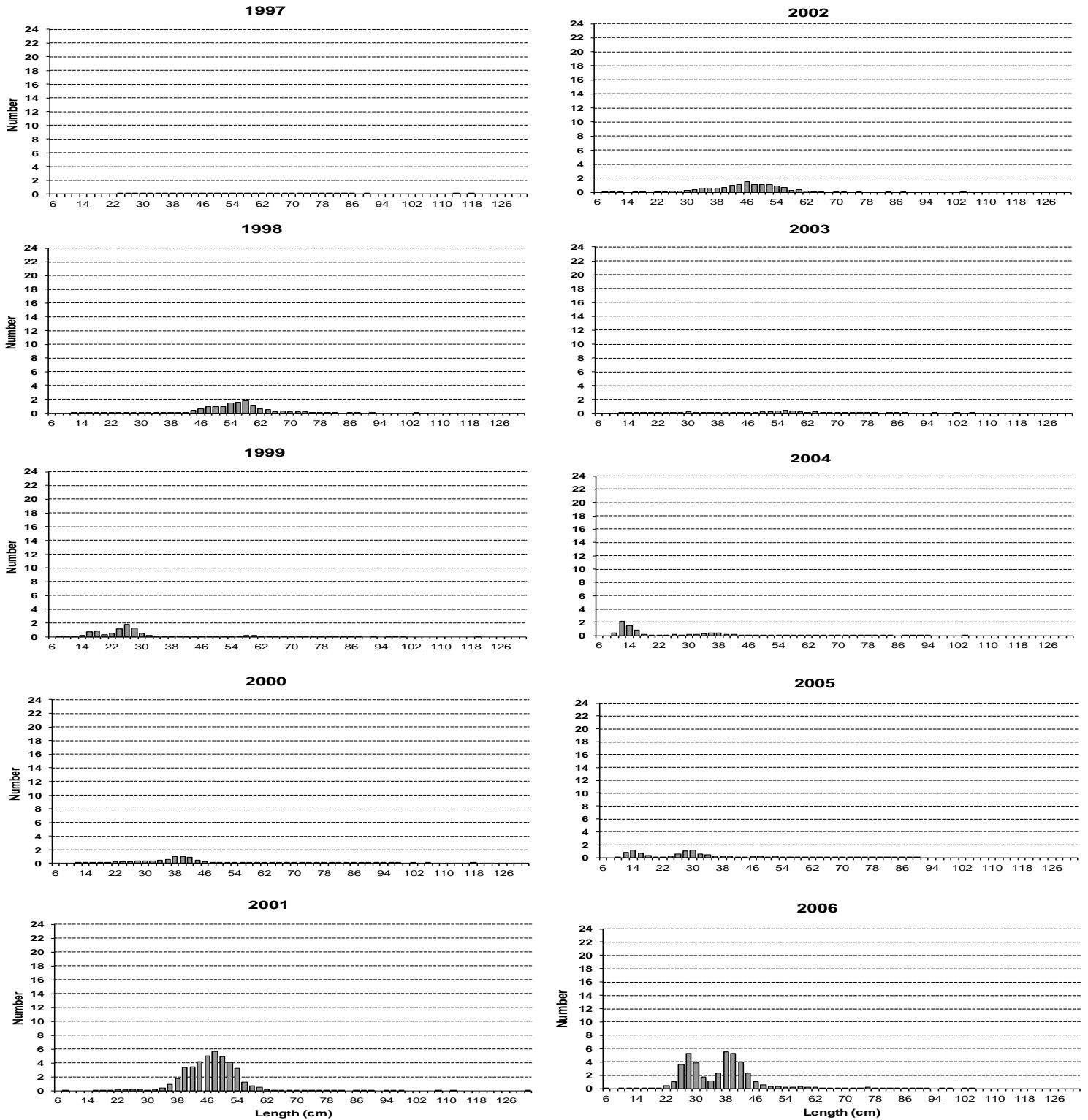


Fig. 18. Atlantic cod length distribution (cm) on NAFO 3NO: 1997-2015. Mean catches per tow number. Data from 2011 to 2015 are in Table 26; data for 1997-2010 can be seen in SCR Doc 13/10.

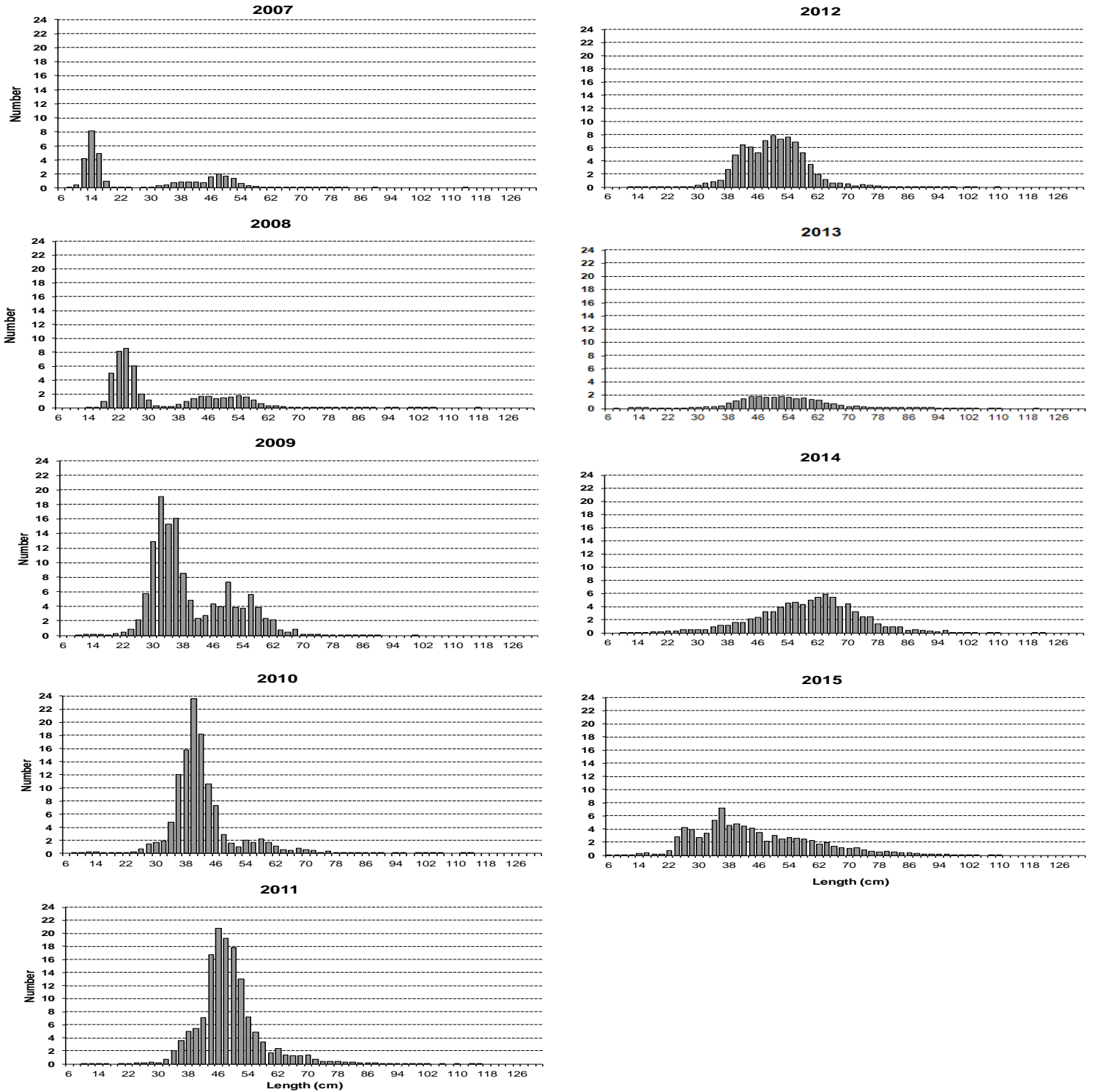


Fig. 18 (cont.). Atlantic cod length distribution (cm) on NAFO 3NO: 1997-2015. Mean catches per tow number. Data from 2011 to 2015 are in Table 26; data for 1997-2010 can be seen in SCR Doc 13/10.

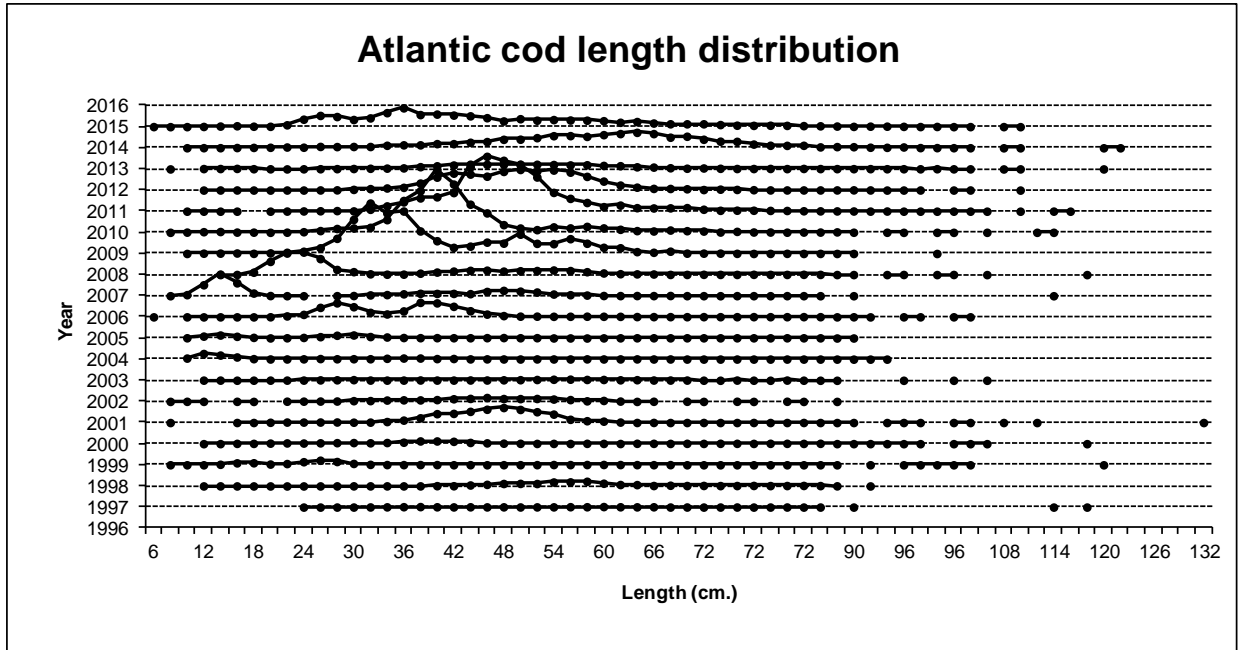


Fig.19. Atlantic cod stratified mean catches in Kg and \pm SD by year and mean number by year. Spanish Spring surveys in NAFO Div. 3NO: 1997-2015. Data from 2011 to 2015 are in Table 26; data for 1997-2010 can be seen in SCR Doc 13/10.

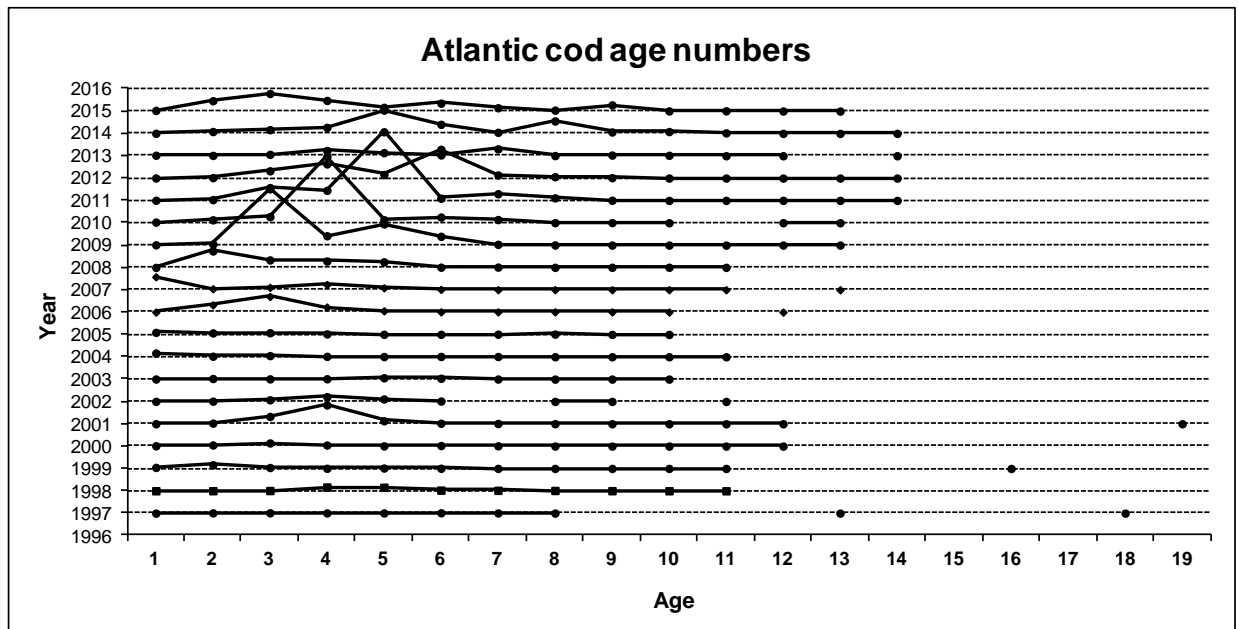


Fig. 20. Atlantic cod biomass calculated by the swept method in tons and \pm SD by year. Spanish Spring surveys in NAFO Div. 3NO: 1997-2015. Data from 2011 to 2015 are in Table 27; data for 1997-2010 can be seen in SCR Doc 13/10.

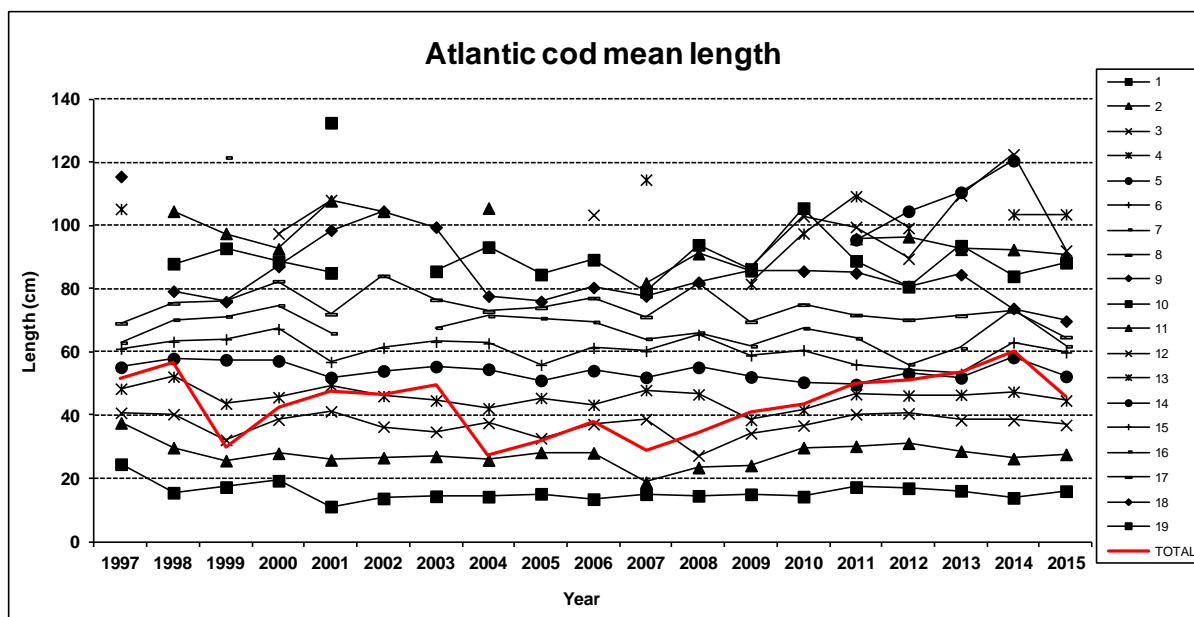


Fig. 21. Atlantic cod mean length (cm) at age on NAFO 3NO: 1997-2015. Ages from 1 to 19. Data from 2011 to 2015 are in Table 28; data for 1997-2010 can be seen in SCR Doc 13/10.

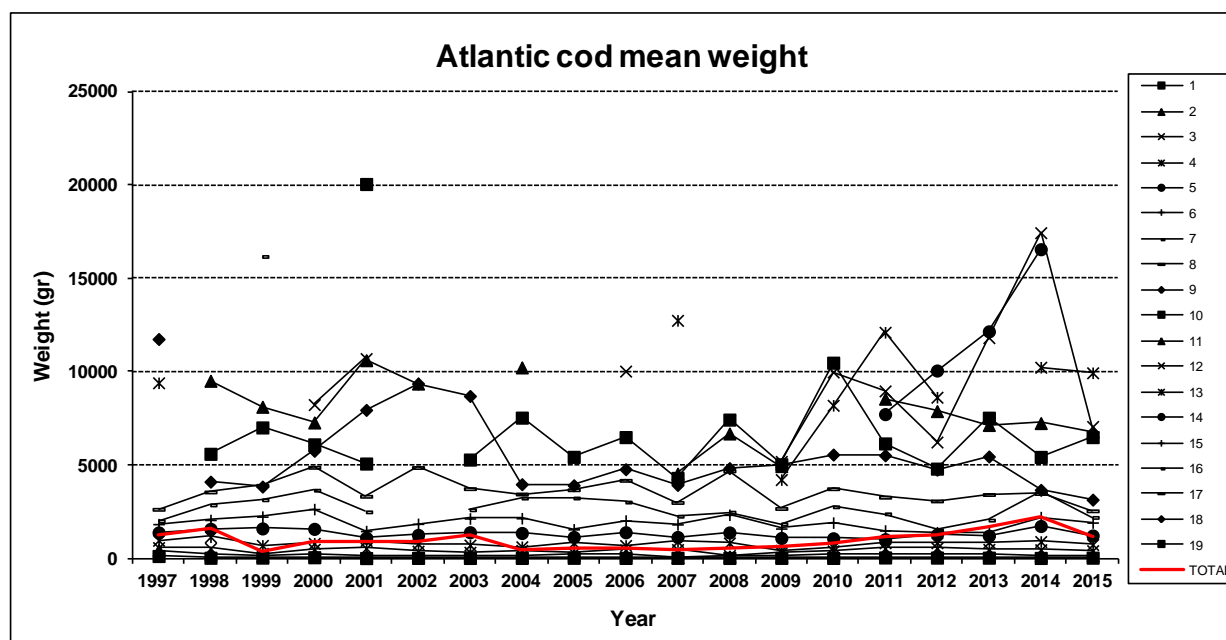


Fig. 22. Atlantic cod mean weight (gr) at age on NAFO 3NO: 1997-2015. Ages from 1 to 19. Data from 2011 to 2015 are in Table 29; data for 1997-2010 can be seen in SCR Doc 13/10.